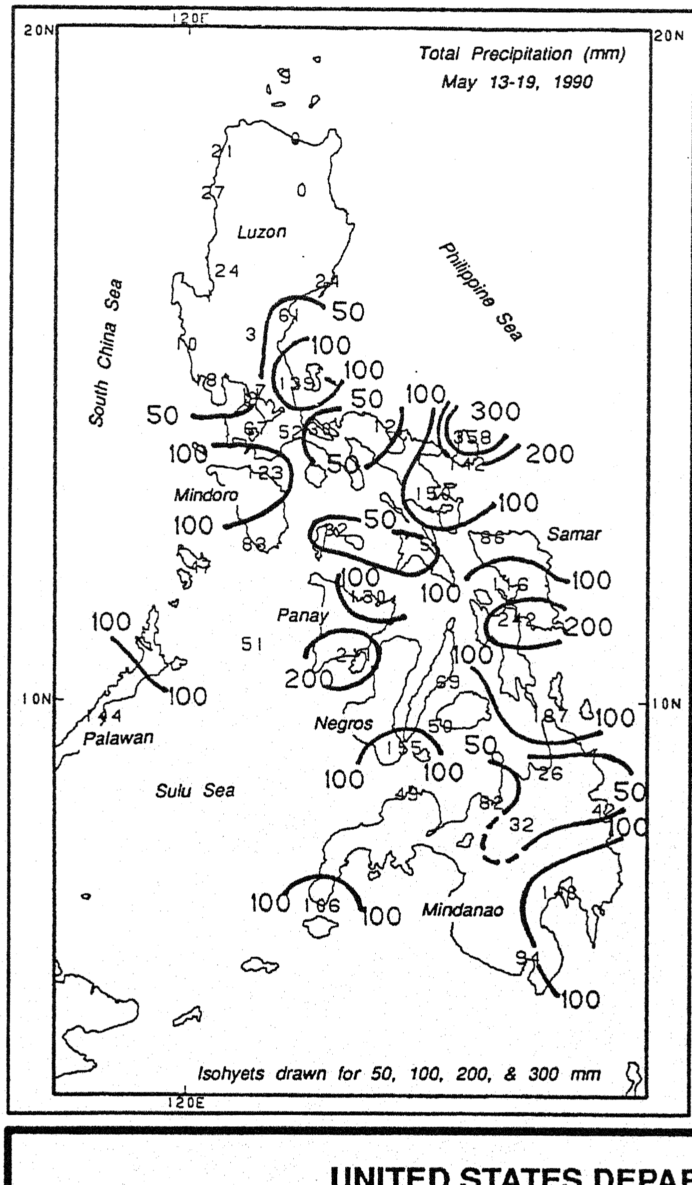
CLIMATE ANALYSIS CENTER

*CONTAINS:*
EL NINO
SOUTHERN
OSCILLATION
ADVISORY 90/4

# WEEKLY CLIMATE BULLETIN

**No. 90/20** Washington, DC May 19, 1990




*THE FIRST GENEROUS, WIDESPREAD RAINS (UP TO 358 MM) SINCE MID–JANUARY FELL ACROSS MUCH OF THE PHILIPPINES. MINIMAL–STRENGTH TYPHOON MIRIAN BRUSHED BY THE EASTERN COAST WHILE ABUNDANT CONVECTIVE ACTIVITY SOAKED THE SOUTHWESTERN PART OF THE COUNTRY. UNFORTUNATELY, MOST OF NORTHERN LUZON RECEIVED LITTLE OR NO RAINFALL. ALTHOUGH FEBRUARY–APRIL IS NORMALLY THE DRIEST TIME OF THE YEAR ACROSS WESTERN SECTIONS, MOST STATIONS HAVE RECORDED WELL UNDER HALF THE USUAL RAINFALL DURING THE LAST 4 MONTHS, AND DEFICITS HAVE ACCUMULATED TO 150 MM IN NORTHERN AREAS AND OVER 400 MM IN THE NORMALLY WETTER EAST–CENTRAL PHILIPPINES.*

**UNITED STATES DEPARTMENT OF COMMERCE**
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE–NATIONAL METEOROLOGICAL CENTER
**CLIMATE ANALYSIS CENTER**

# WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two–week temperature anomalies.
- Global four–week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three–month precipitation anomalies (once a month).
- Global twelve–month precipitation anomalies (every three months).
- Global three–month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

*Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.*


## STAFF

| | |
|---|---|
| Editor | David Miskus |
| Associate Editor | Richard J. Tinker |
| Contributors | Monica L. Pogue |
| | Paul Sabol |
| Graphics | Robert H. Churchill |

*To receive copies of the **Bulletin** or to change mailing address, write to:*

Climate Analysis Center, W/NMC53
Attn: WEEKLY CLIMATE BULLETIN
NOAA, National Weather Service
Washington, DC 20233

*For CHANGE OF ADDRESS, please include a copy of your old mailing label.*

**Phone: (301) 763–8071**


## WEEKLY CLIMATE BULLETIN REQUESTS

☐ **Please ADD my address to your mailing list.**

☐ **Please CHANGE my address on your mailing list.**

☐ **Please DROP my address from your mailing list.**

Name ______________________________

Organization ______________________________

Address ______________________________

City ______________________ State __________ Zip __________

# GLOBAL CLIMATE HIGHLIGHTS

## *MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF MAY 19, 1990*

1. *Central United States*:

### TORRENTIAL DOWNPOURS CONTINUE.

Portions of west–central Arkansas, still recovering from the intense rainfall and flooding of early May, were once again inundated with up to 343 mm of rain. Severe flash and river flooding plagued the western half of Arkansas, eastern Oklahoma, and northeastern Texas, according to the Office of Hydrology, where most locations received another 76 mm to 152 mm of rain. During the past five weeks, the ongoing deluge has dumped 400 mm to 610 mm across most of the aforementioned region, causing near–record flooding and forcing thousands from their homes, according to press reports. In addition, a band from eastern Kansas eastward to southwestern Ohio measured between 75 mm and 200 mm while isolated parts of western Missouri recorded nearly 300 mm. Wet weather dominated the vast majority of the nation's midsection as more than 50 mm was recorded throughout much of the eastern half of the Great Plains and the Mississippi Valley [18 weeks].

2. *Central South America*:

### COLDER AIR MOVES IN.

The recent warm spell came to an abrupt end as most of northern Argentina and southern Paraguay recorded weekly temperatures averaging 3°C to 5°C below normal [Ended after 5 weeks].

3. *Scandinavia and Northwestern Continental Europe*:

### NORTHERN PORTIONS EXPERIENCE RELIEF, BUT SOUTHERN SECTIONS REMAIN WARM.

Near normal temperatures returned to Scandinavia and northern continental Europe, but southern areas experienced unseasonably warm weather. Weekly departures ranged between +3°C and +5°C from northern France, southern West Germany, and Austria southward across the continent [Ending after 6 weeks].

4. *The Sahel*:

### STILL TOO WARM IN MANY AREAS.

Eastern portions observed near to slightly above normal temperatures last week, but pockets of excessive heat continued in the western areas where weekly departures ranged between +2°C and +4°C. Readings of 46°C to 48°C seared much of Senegal, and most of Cote d'Ivoire also recorded temperatures well above 40°C [6 weeks].

5. *East–Central India*:

### COOL CONDITIONS DOMINATE REGION.

In the wake of Tropical Cyclone 2B, one of the worst storms to batter east–central India in more than a decade, searing heat has not hampered cleanup efforts. For the past three weeks, exceptionally chilly weather has dominated areas just north and east of where 2B made landfall. Although weekly temperatures averaged between 25°C and 31°C, these values are 3°C to 6°C below normal and have persisted since the beginning of May [3 weeks].

6. *Southeastern China, Taiwan, and Southern Japan*:

### HEAVY RAINS PERSIST IN MOST AREAS.

Most of the southeastern quarter of China measured 30 mm to 80 mm of rain; however, up to 200 mm deluged scattered locations in east–central and southeastern China, keeping moisture surpluses high. In addition, the remnants of dying Typhoon Marian dumped 75 mm to 254 mm on Taiwan and the southern third of Japan [8 weeks].

7. *The Philippines*:

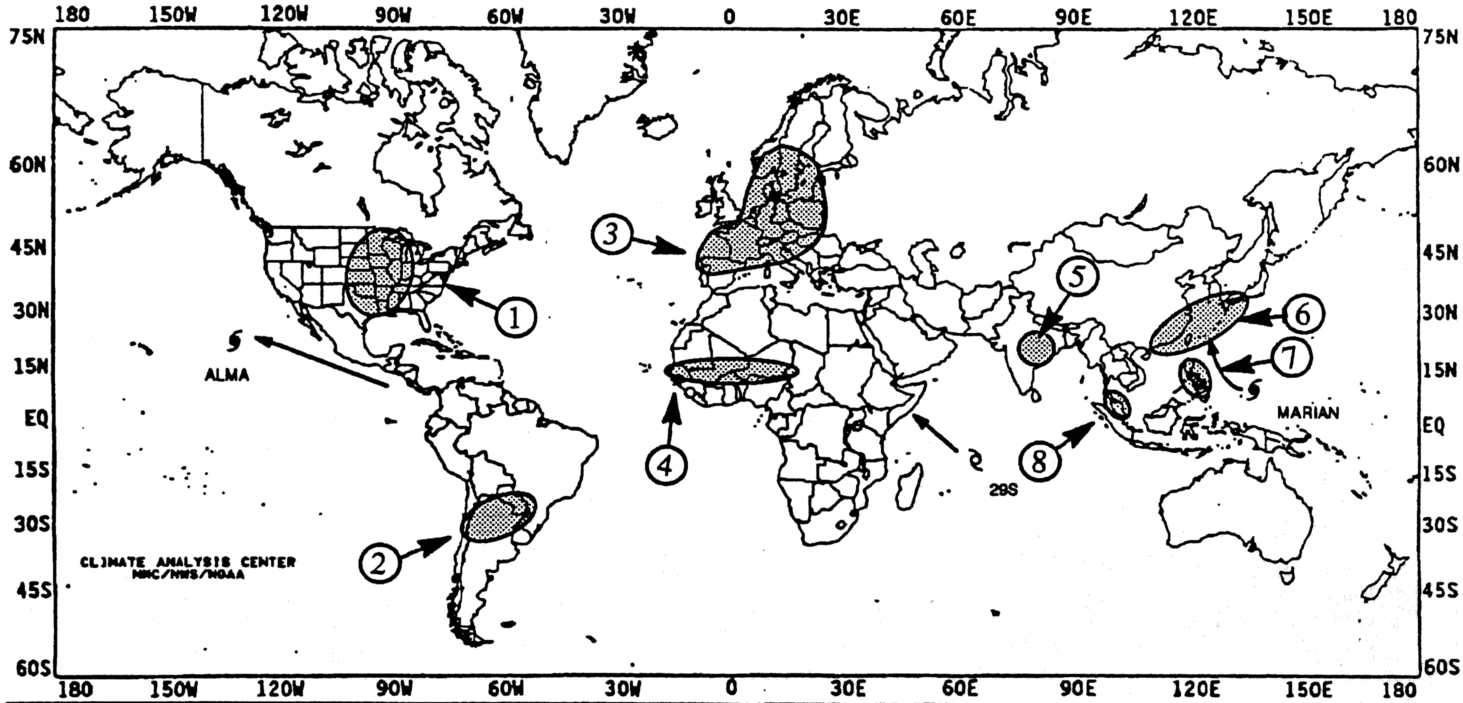
### DROUGHT ABRUPTLY ENDED BY TYPHOON MARIAN.

Typhoon Marian quickly developed in the Pacific Ocean and skirted the eastern side of the islands, dumping ample rainfall on most locations (see front cover). Up to 358 mm drenched east–central portions of the nation, with daily totals as high as 234 mm. Most of the remainder of the nation recorded between 70 mm and 200 mm, effectively ending recent dryness, although most of the rains missed the extreme northern (10 mm to 30 mm) and southern (30 mm to 60 mm) parts of the country [Ended after 11 weeks].

8. *Malay Peninsula*:

### SCATTERED TROPICAL THUNDERSHOWERS DRENCH SOUTHERN THAILAND.

Exceptionally heavy thunderstorms battered peninsular Thailand, dumping between 150 mm and 397 mm of rain on many locations. Daily totals exceeded 141 mm along the eastern coast [Episodic Event].




**EXPLANATION**

**TEXT:** Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.
**MAP:** Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long–term anomalies, and other details.

# UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

*FOR THE WEEK OF MAY 13 – MAY 19, 1990*

The wet growing season of 1989 across much of the eastern half of the nation made the Drought of 1988 a distant memory, and, similarly, the copious rainfall during the early part of this year makes last year's wetness seem relatively "innocuous". For the fifth consecutive week, intense rainfall, abundant severe weather, and extensive flooding headlined the news as problems generated by moisture surpluses are slowly becoming more extensive in coverage and duration.

A series of cool, Canadian high pressure systems kept chilly air entrenched across the northern half of the nation, particularly in the northern Rockies and Plains, while an unusually strong sub–tropical jet–stream drove warm, humid air northward across the southeastern third of the country, especially through the southern Plains. Small waves of low pressure formed along the boundary between these two conflicting air masses, generating numerous thunderstorms which reached severe levels with unusual frequency.

The northern portion of this cold front rapidly advanced through the upper Mississippi Valley, Great Lakes, Ohio Valley, and Northeast early in the week before weakening. Late in the week, another shot of chilly air behind a reinforcing cold front moved into the upper Mississippi Valley. Thunderstorms that formed along the northern portions of the front tended to move swiftly across locations, keeping rainfall totals relatively low. Farther south, however, the more stationary nature of the frontal system brought slowly–moving thunderstorms to eastern parts of the central and south–central Great Plains, the middle and lower Mississippi Valleys, and the western Ohio Valley.

As these frequently severe thunderstorms crept through the aforementioned areas, scattered locations reported large hail (up to grapefruit–sized in parts of Wyoming, Oklahoma, and Texas on Friday), damaging wind gusts (as high as 90 mph in central Illinois Sunday evening), and extensive tornado outbreaks (especially in Kansas, Missouri, and Oklahoma). In addition, slowly–moving, torrential downpours deluged isolated locations in west–central Arkansas, western Missouri, southern Illinois, and southeastern Indiana. One storm dumped more than a foot of rain on parts of the Hot Springs, AR, area during a 24–hour period beginning Saturday morning, causing a city–wide flash flood that closed most roads, sent hundreds of people from their homes, and swept away several cars and individuals, according to press reports. Fortunately, nobody in the area was killed or reported missing due to the flood.

Widespread flooding continued along many rivers in the south–central Plains and lower Mississippi Valley due to excessive rainfall during late April–early May and from the additional rain that fell last week. Many rivers in Louisiana crested at their second highest level this century as flood waters in the north moved downstream. According to press reports, many hundreds of thousands of acres of farmland remained underwater. In addition, flash flooding closed several roads and damaged homes in western Missouri while the White River in Indiana crested at its highest level in thirty years. Losses due to flooding along the Arkansas, Trinity, and Red Rivers exceeds one–hundred million dollars and thirteen lives, and floods in Illinois and Missouri caused three additional deaths.

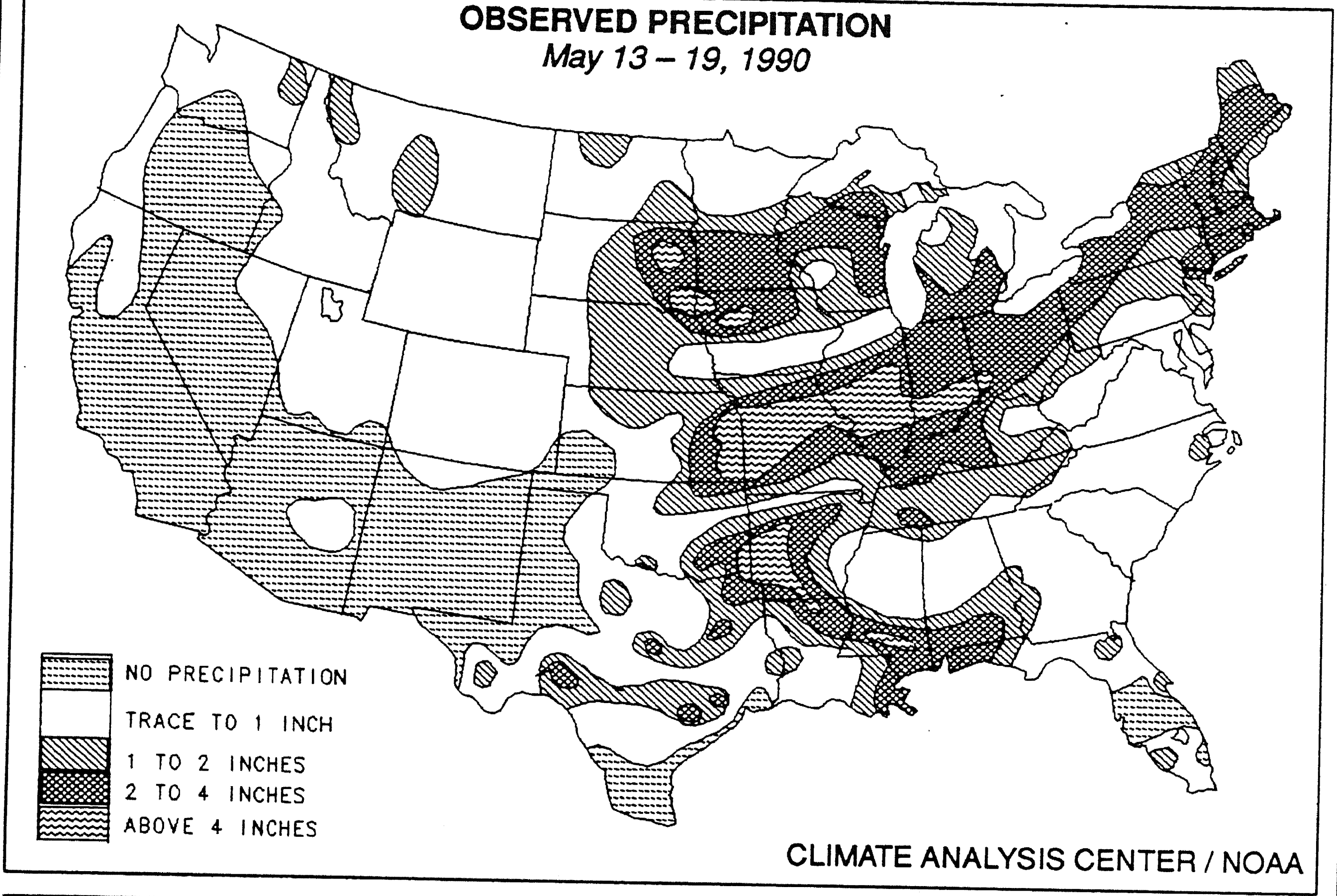
Meanwhile, relatively dry weather along the central Gulf Coast brought relief from Sunday morning's (May 13) flash floods in southern Mississippi (up to 10 inches in 6 hours), but continued dry weather along the southern Atlantic Coast and throughout the western third of the country aggravated long–term moisture deficits. In California, approximately 20% of the state's 30 million residents are on water rationing. Farther east, quickly–moving thunderstorms brought brief heavy rains to much of the Northeast, 65–mph wind gusts in upstate New York, and a few isolated tornadoes to portions of southern Pennsylvania, northern Maryland, and western North Carolina.

According to the River Forecast Centers, up to 13.5 inches of rain drenched west–central Arkansas, most of which fell during Saturday afternoon and evening. Portions of the Kansas City, MO, area were also deluged by more than ten inches of rain. Heavy rainfall (more than four inches) was widespread in an area from the east–central Great Plains eastward through the lower Ohio Valley, with a few locations in southern Indiana and Illinois reporting more than 6 inches (Table 1). Small portions of the lower Mississippi Valley, middle and lower Missouri Valley, and northern New Jersey also experienced heavy rains.

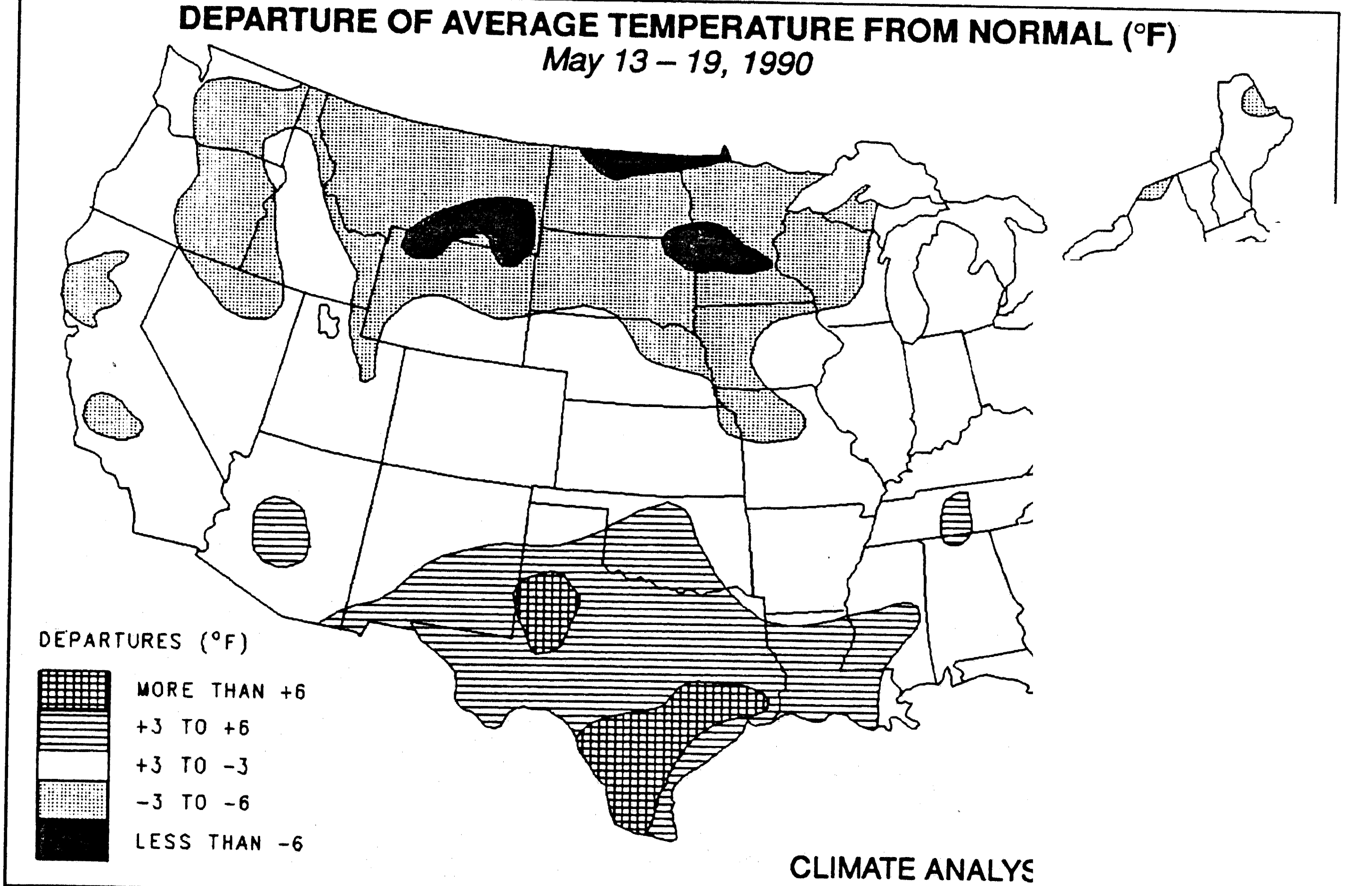
Most of the eastern half of the nation measured moderate rainfall totals, with light amounts restricted to portions of central and southern Texas, the extreme northern Plains, the northern half of Illinois, and most of the Southeast, southern Atlantic Coast, and mid–Atlantic. Little or no precipitation fell once again west of the High Plains, except for light precipitation in the Pacific Northwest and northern Rockies. Light to moderate precipitation was observed in west–central and south–central Alaska as well as in extreme western Hawaii, but little or no precipitation fell across the vast majority of both states.

The strong flow of tropical air brought unseasonably warm weather to the southern Plains, peninsular Florida, and along the southern half of the Atlantic Coast. Weekly departures approached +7°F in western and southern Texas. About a dozen record daily maximum temperatures were established across the southern tier of states during the week as highs reached into the nineties across the desert Southwest, southern Plains, southern Atlantic Coast states, and sections of the lower Mississippi Valley. Unseasonably mild weather was also reported in northern and central Alaska where weekly departures reached +11°F (Table 2) and readings pushed into the seventies at Fairbanks and a few other locations.

In contrast, persistent outbreaks of chilly, Canadian air brought unseasonably cool weather to the northern Intermountain West and the northern thirds of the Rockies and Plains. Departures below –6°F occurred at scattered locations throughout the region (Table 3). Several daily minimum temperature records were set during the week as sub–freezing reading gripped the northern and central Rockies and the northern Plains.



OBSERVED PRECIPITATION
May 13 – 19, 1990
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS CENTER / NOAA

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
May 13 – 19, 1990
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6

**TABLE 1. Selected stations with 3.00 or more inches of precipitation for the week.**

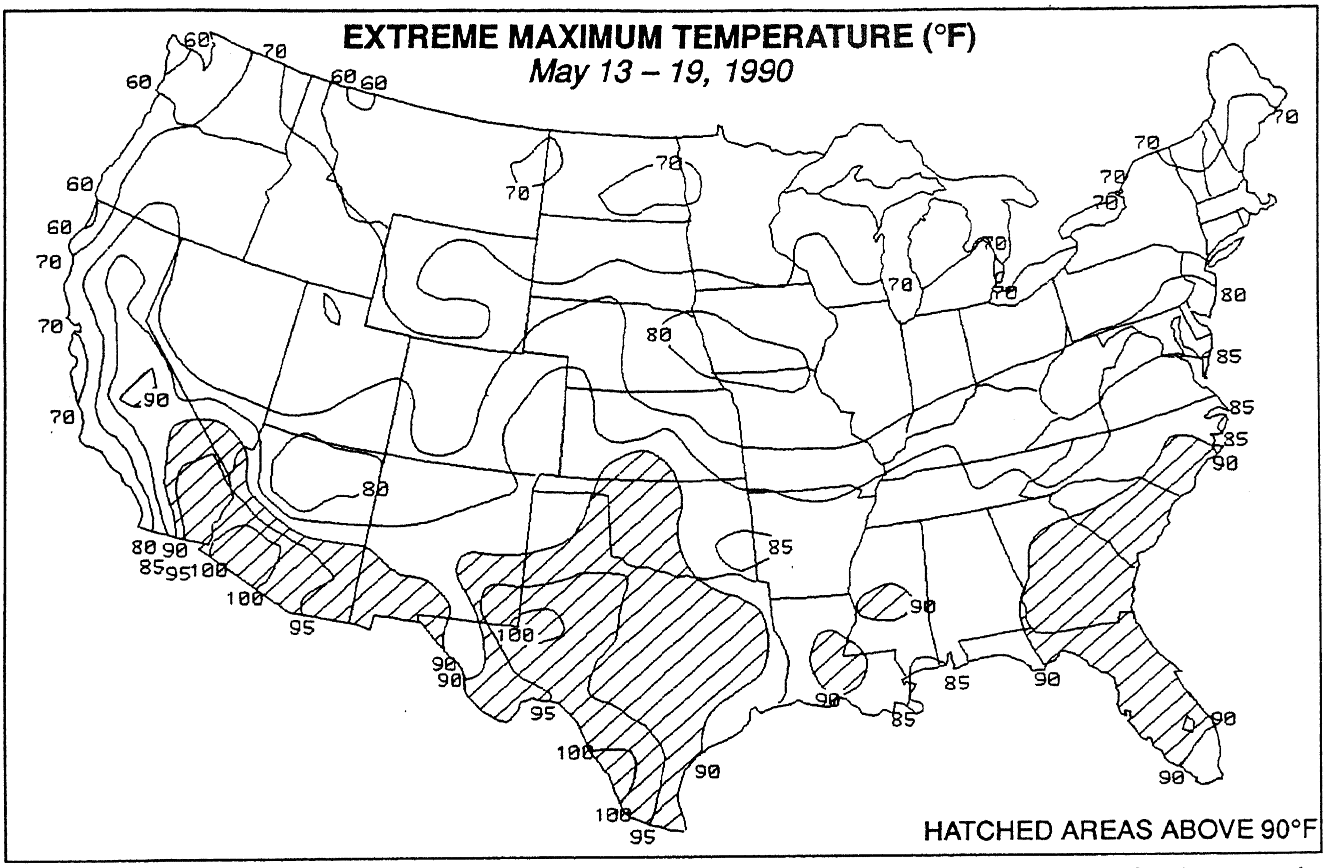
| STATION | TOTAL (INCHES) | STATION | TOTAL (INCHES) |
|---|---|---|---|
| COLUMBIA, MO | 5.68 | EVANSVILLE, IN | 3.85 |
| SPRINGFIELD, MO | 5.65 | LOUISVILLE/STANDIFORD, KY | 3.82 |
| KNOB NOSTER/WHITEMAN AFB, MO | 5.31 | UTICA, NY | 3.55 |
| ST. LOUIS, MO | 5.24 | BUFFALO, NY | 3.54 |
| KOKEE, KAUAI, HI | 5.23 | NEW ORLEANS/LAKE FRONT, LA | 3.22 |
| JOPLIN, MO | 4.67 | JACKSON, MI | 3.18 |
| SPRINGFIELD, IL | 4.59 | ROCHESTER, NY | 3.17 |
| CHANUTE, KS | 4.51 | NEW YORK/LA GUARDIA, NY | 3.12 |
| HURON, ND | 4.49 | MOBILE, AL | 3.12 |
| CINCINNATI, OH | 4.43 | SOUTH BEND, IN | 3.11 |
| KANSAS CITY/INTL., MO | 4.29 | ROME/GRIFFISS AFB, NY | 3.11 |
| CINCINNATI/LUNKEN, OH | 4.09 | | |

**TABLE 2. Selected stations with temperatures averaging 5.0°F or more ABOVE normal for the week.**

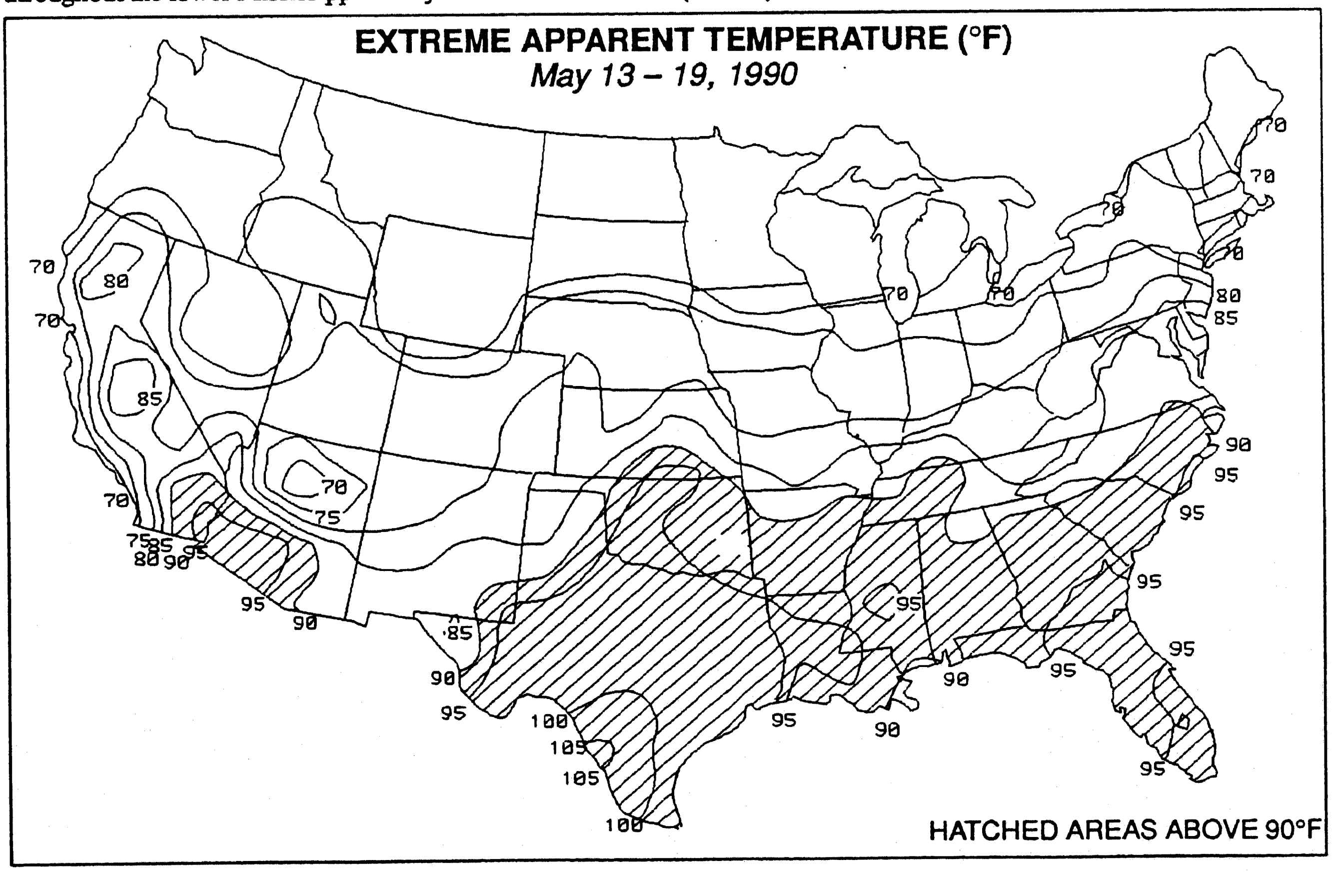
| STATION | DEPARTURE (°F) | AVERAGE (°F) | STATION | DEPARTURE (°F) | AVERAGE (°F) |
|---|---|---|---|---|---|
| BARROW, AK | +11.2 | 30.5 | LUBBOCK, TX | +6.3 | 75.1 |
| KOTZEBUE, AK | +10.2 | 42.4 | AUSTIN, TX | +6.2 | 81.1 |
| BETTLES, AK | +9.9 | 54.9 | MIDLAND, TX | +6.2 | 78.6 |
| BARTER ISLAND, AK | +9.6 | 31.2 | YAKUTAT, AK | +5.9 | 48.7 |
| FAIRBANKS, AK | +8.8 | 57.3 | COLLEGE STATION, TX | +5.8 | 80.5 |
| BIG DELTA, AK | +8.4 | 55.3 | VICTORIA, TX | +5.7 | 82.3 |
| NORTHWAY, AK | +7.9 | 51.9 | NOME, AK | +5.6 | 41.8 |
| MCGRATH, AK | +7.5 | 52.4 | PORT ARTHUR, TX | +5.5 | 80.6 |
| KINGSVILLE NAS, TX | +7.4 | 85.4 | BROWNSVILLE, TX | +5.4 | 84.6 |
| SAN ANTONIO, TX | +7.4 | 83.0 | ANCHORAGE, AK | +5.4 | 51.7 |
| HOMER, AK | +7.3 | 49.6 | ROSWELL, NM | +5.2 | 74.3 |
| HOUSTON, TX | +6.7 | 82.1 | TAMPA, FL | +5.1 | 82.4 |
| KING SALMON, AK | +6.6 | 49.0 | ABILENE, TX | +5.1 | 77.5 |
| TALKEETNA, AK | +6.4 | 51.0 | PALACIOS, TX | +5.0 | 80.9 |

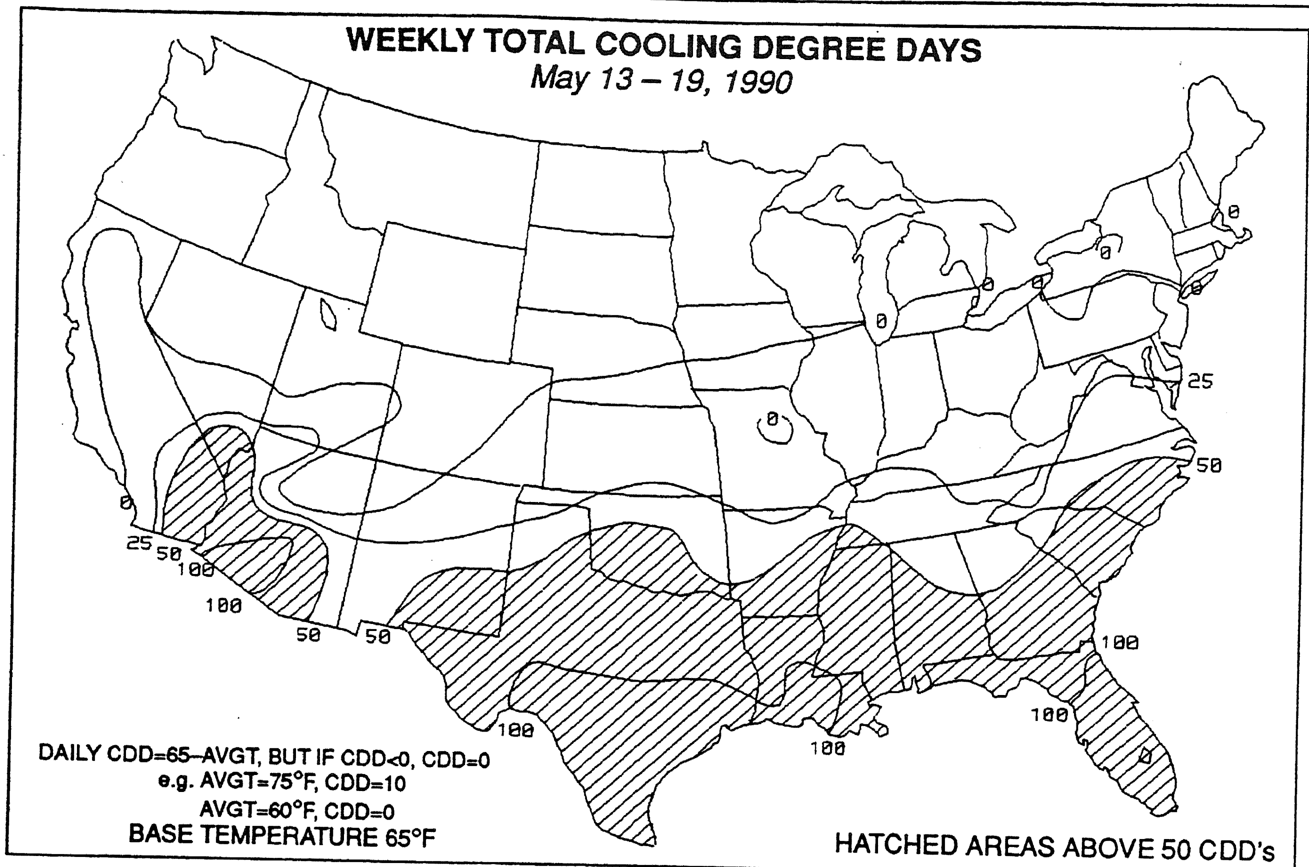
**TABLE 3. Selected stations with temperatures averaging 4.5°F or more BELOW normal for the week.**

| STATION | DEPARTURE (°F) | AVERAGE (°F) | STATION | DEPARTURE (°F) | AVERAGE (°F) |
|---|---|---|---|---|---|
| MINOT, ND | -6.8 | 47.1 | FARGO, ND | -4.9 | 50.8 |
| ALEXANDRIA, MN | -6.5 | 49.1 | SIOUX FALLS, SD | -4.9 | 53.2 |
| GREAT FALLS, MT | -6.3 | 47.1 | DEVIL'S LAKE, ND | -4.8 | 47.6 |
| BILLINGS, MT | -6.1 | 48.8 | NORFOLK, NE | -4.8 | 55.8 |
| WATERTOWN, SD | -6.1 | 49.4 | CUT BANK, MT | -4.7 | 44.9 |
| ABERDEEN, SD | -5.9 | 50.6 | YAKIMA, WA | -4.7 | 52.8 |
| MILES CITY, MT | -5.7 | 51.2 | BUTTE, MT | -4.6 | 42.9 |
| HAVRE, MT | -5.5 | 49.5 | BOZEMAN, MT | -4.6 | 46.0 |
| MINNEAPOLIS, MN | -5.5 | 52.9 | KALISPELL, MT | -4.6 | 47.1 |
| GRAND FORKS, ND | -5.4 | 49.1 | HELENA, MT | -4.6 | 47.7 |
| ROCHESTER, MN | -5.3 | 51.5 | SEXTON SUMMIT, OR | -4.5 | 44.6 |
| ST. CLOUD, MN | -5.1 | 50.8 | BURNS, OR | -4.5 | 47.7 |
| EAU CLAIRE, WI | -5.0 | 52.0 | MISSOULA, MT | -4.5 | 47.7 |
| LA CROSSE, WI | -5.0 | 54.3 | WAUSAU, WI | -4.5 | 51.1 |
| SHERIDAN, WY | -4.9 | 48.1 | RAPID CITY, SD | -4.5 | 51.1 |

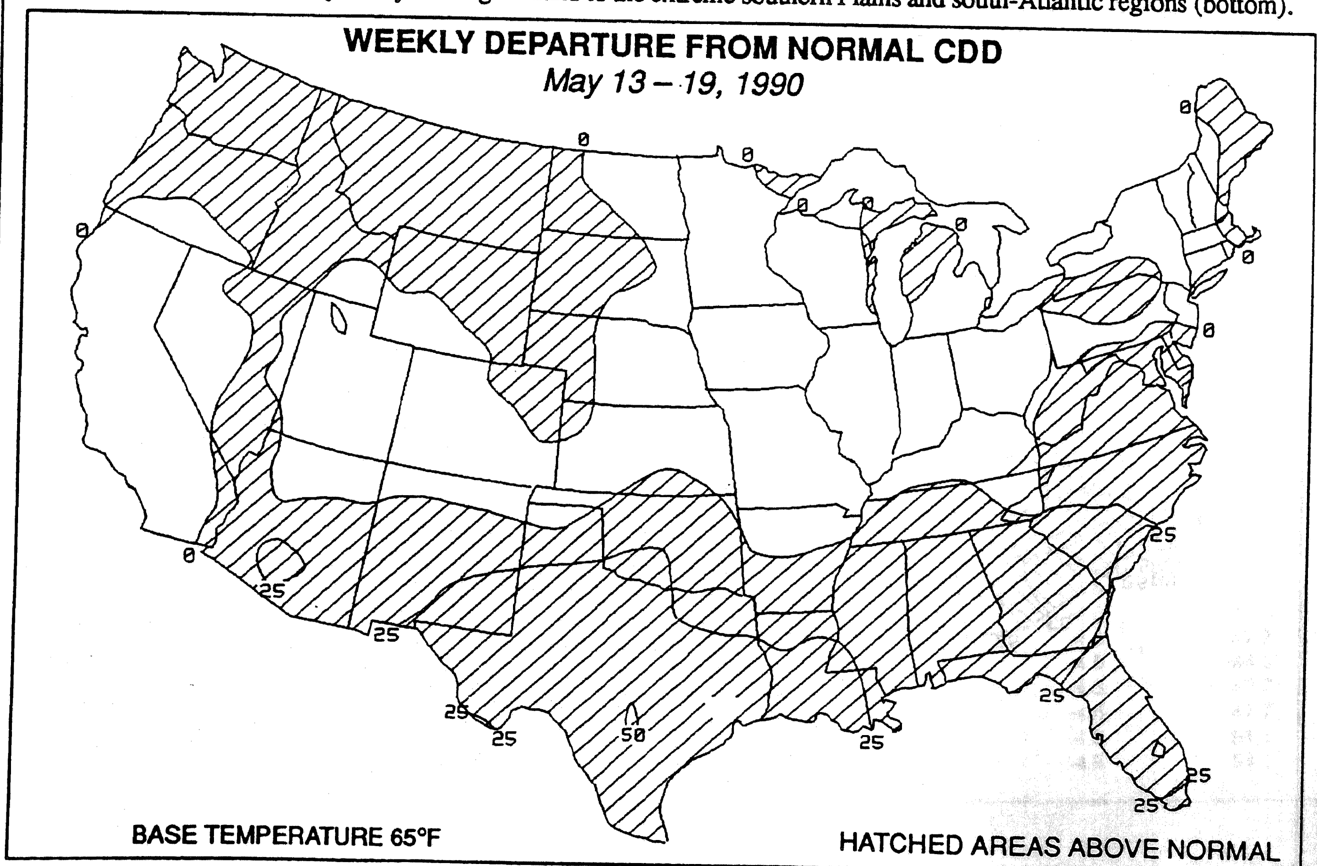


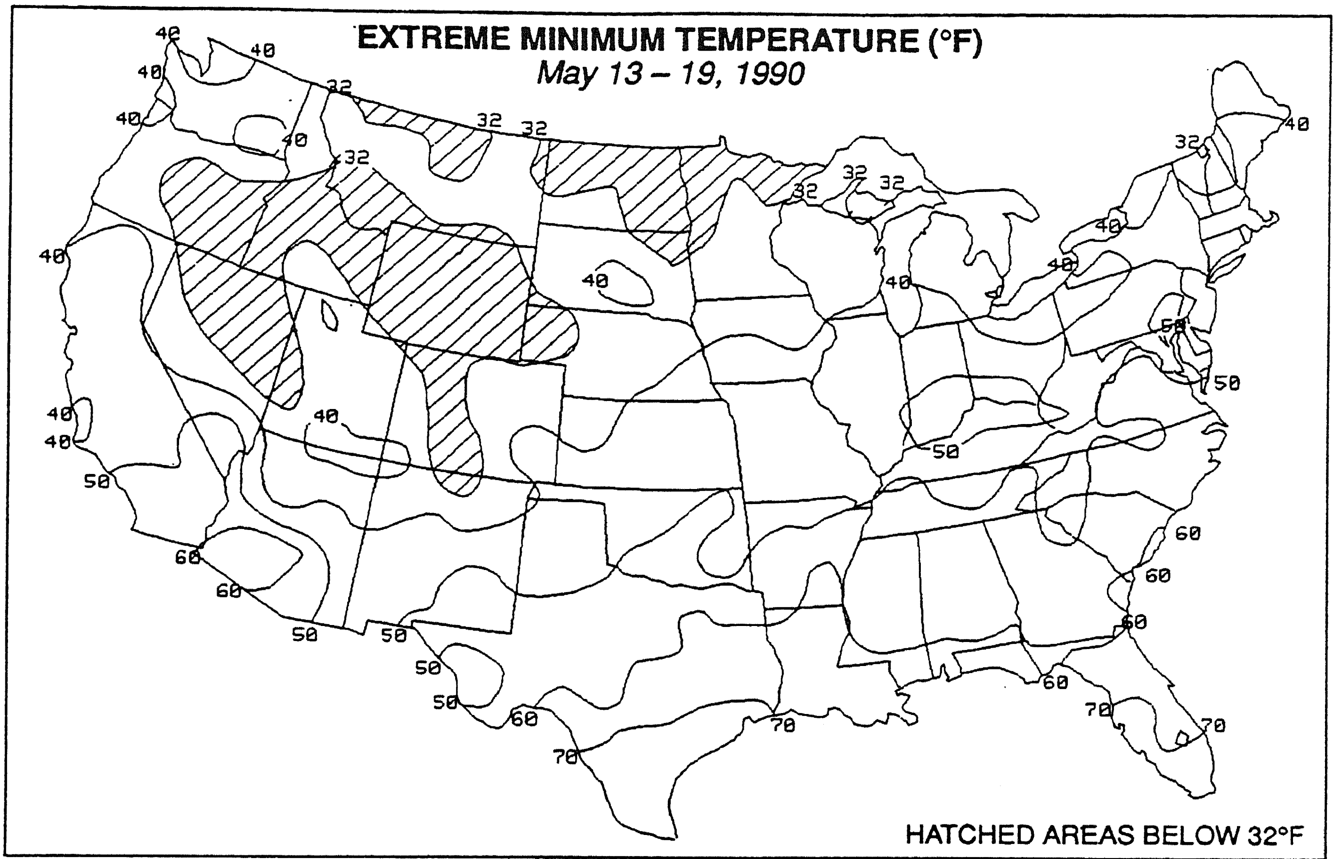

A strong flow of tropical air across the southern tier of states sent temperatures into the nineties in the Desert Southwest, southern Plains, and south–Atlantic (top) while high humidities and warm conditions generated apparent temperatures above 90°F throughout the lower Mississippi Valley and Southeast as well (bottom).



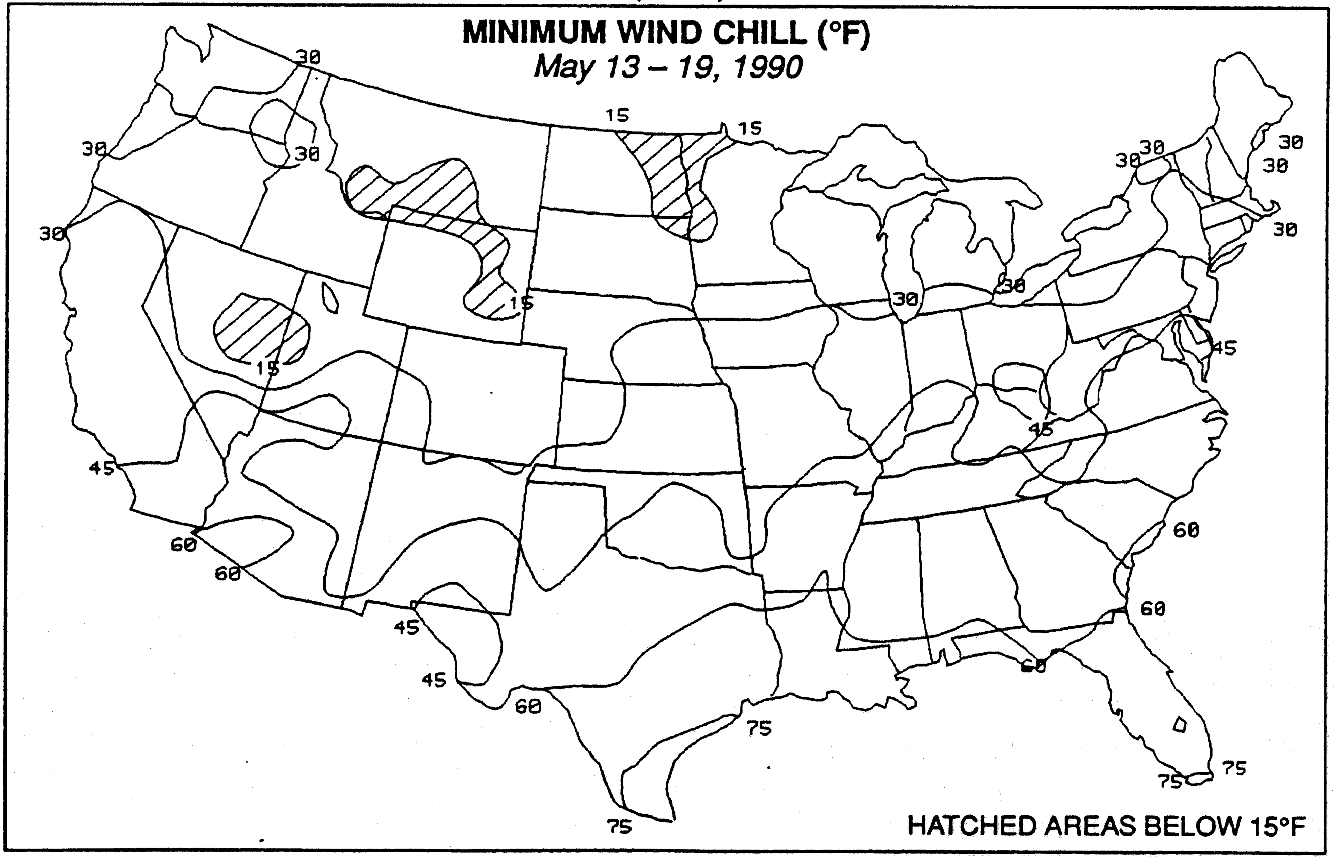


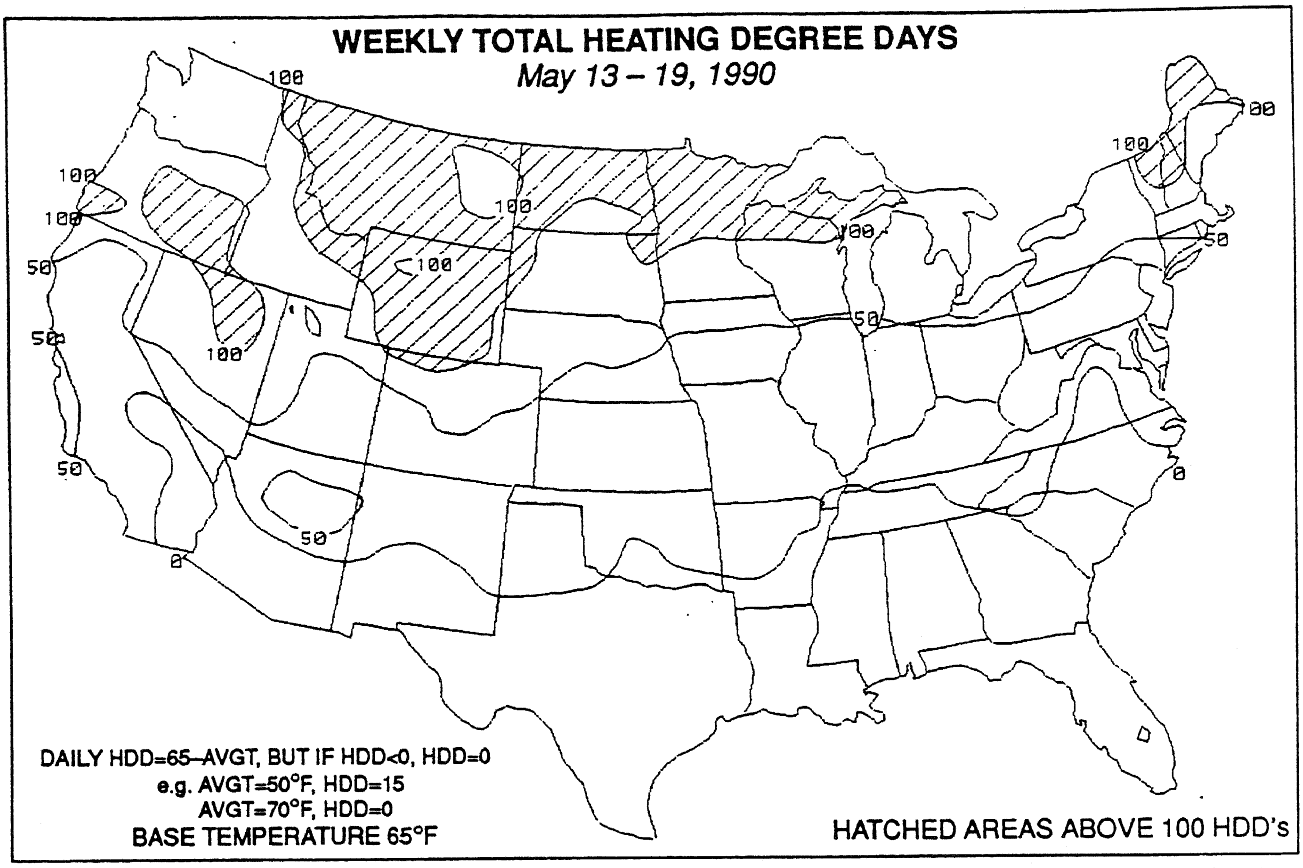

Above normal temperatures across the southern tier of states generated significant cooling demand in much of the Desert Southwest, southern Plains, lower Mississippi Valley, and south-Atlantic (top). Cooler weather throughout most of the nation, however, limited abnormally heavy cooling demand to the extreme southern Plains and south-Atlantic regions (bottom).



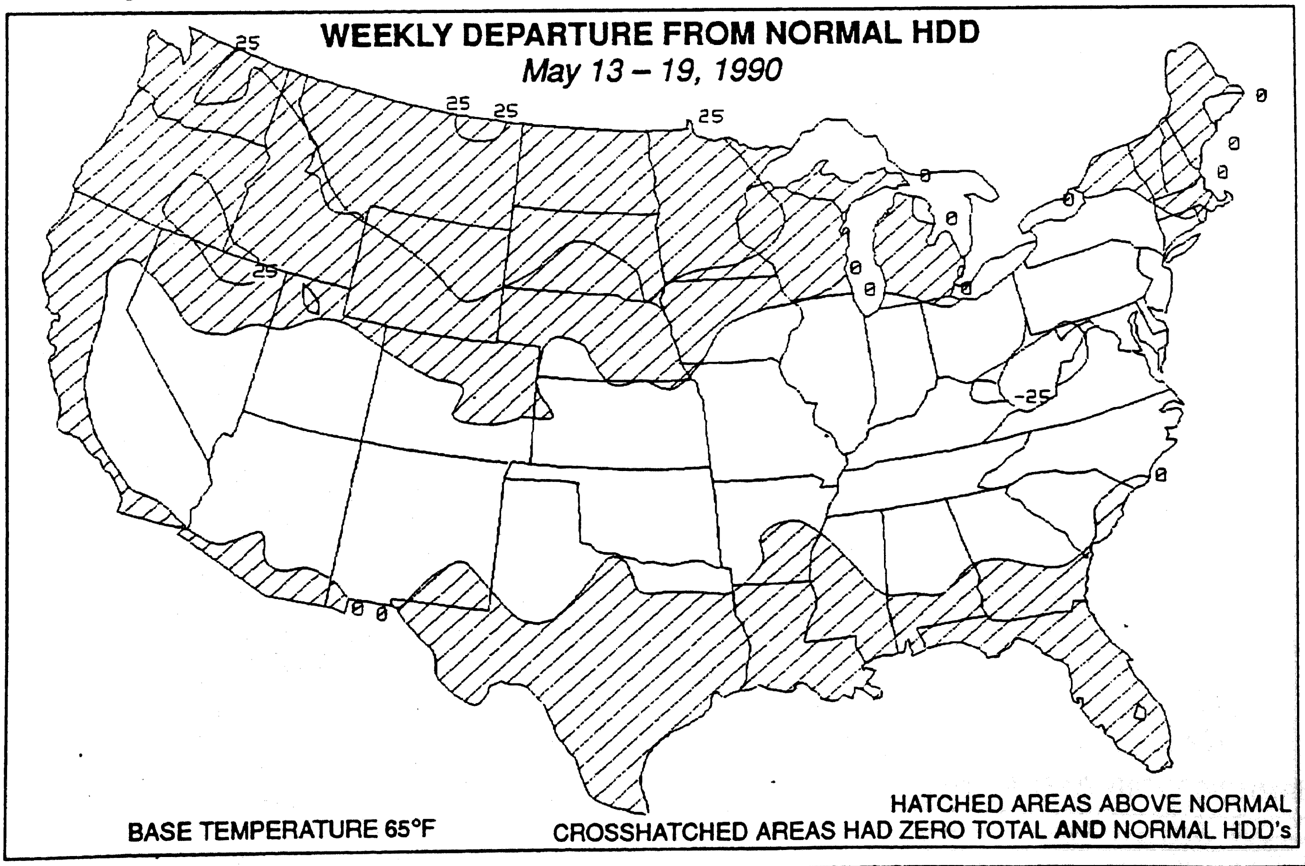



Several late–season invasions of cool, Canadian air brought sub-freezing temperatures to parts of the northern halves of the Rockies and Intermountain West as well as extreme northern portions of the Great Plains (top). Gusty winds, however, did not accompany the chilly air in most locations as low wind chills (below 15°F) affected only scattered locations across the Great Basin, northern Rockies, and northern Great Plains (bottom).



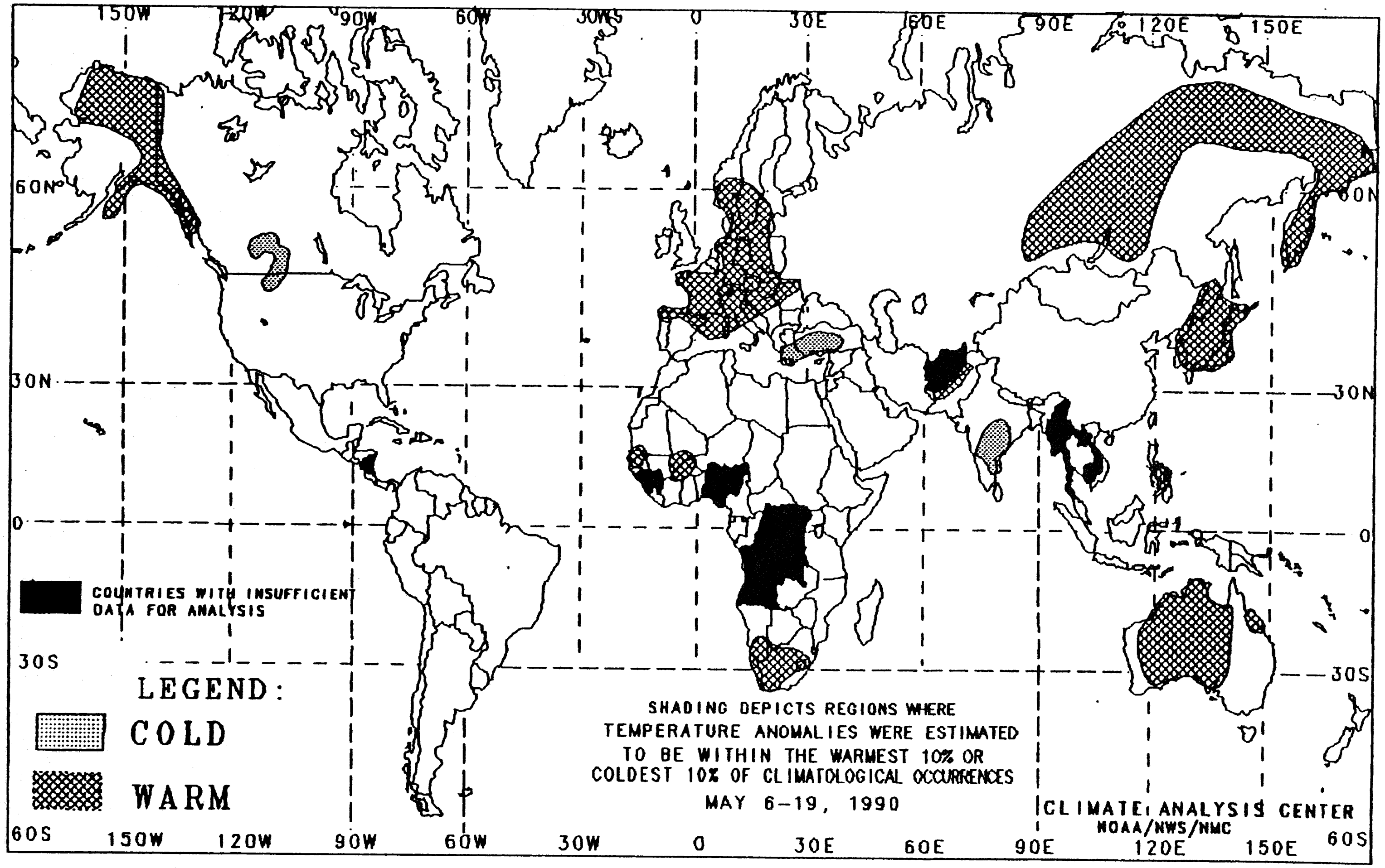



While southern parts of the country baked, cool weather entrenched across northern sections of the Intermountain West, Rockies, Great Plains, and New England produced significant heating usage (top) and above normal heating demand in most of those regions. Lighter than usual heating demand was restricted to the central Appalachians (bottom).



# GLOBAL TEMPERATURE ANOMALIES

## *2 WEEKS*




The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

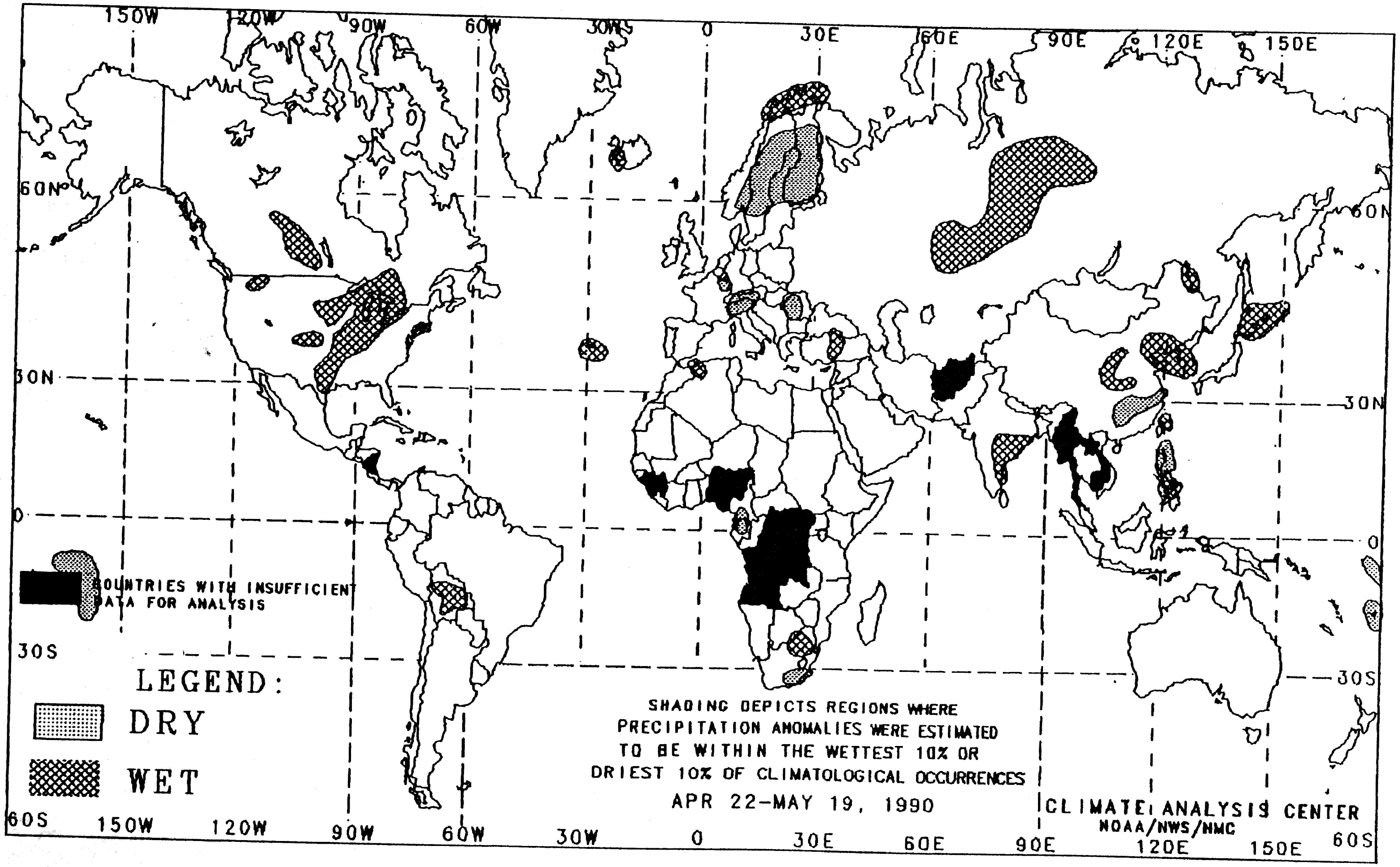
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

# PRECIPITATION ANOMALIES

## 4 WEEKS




The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

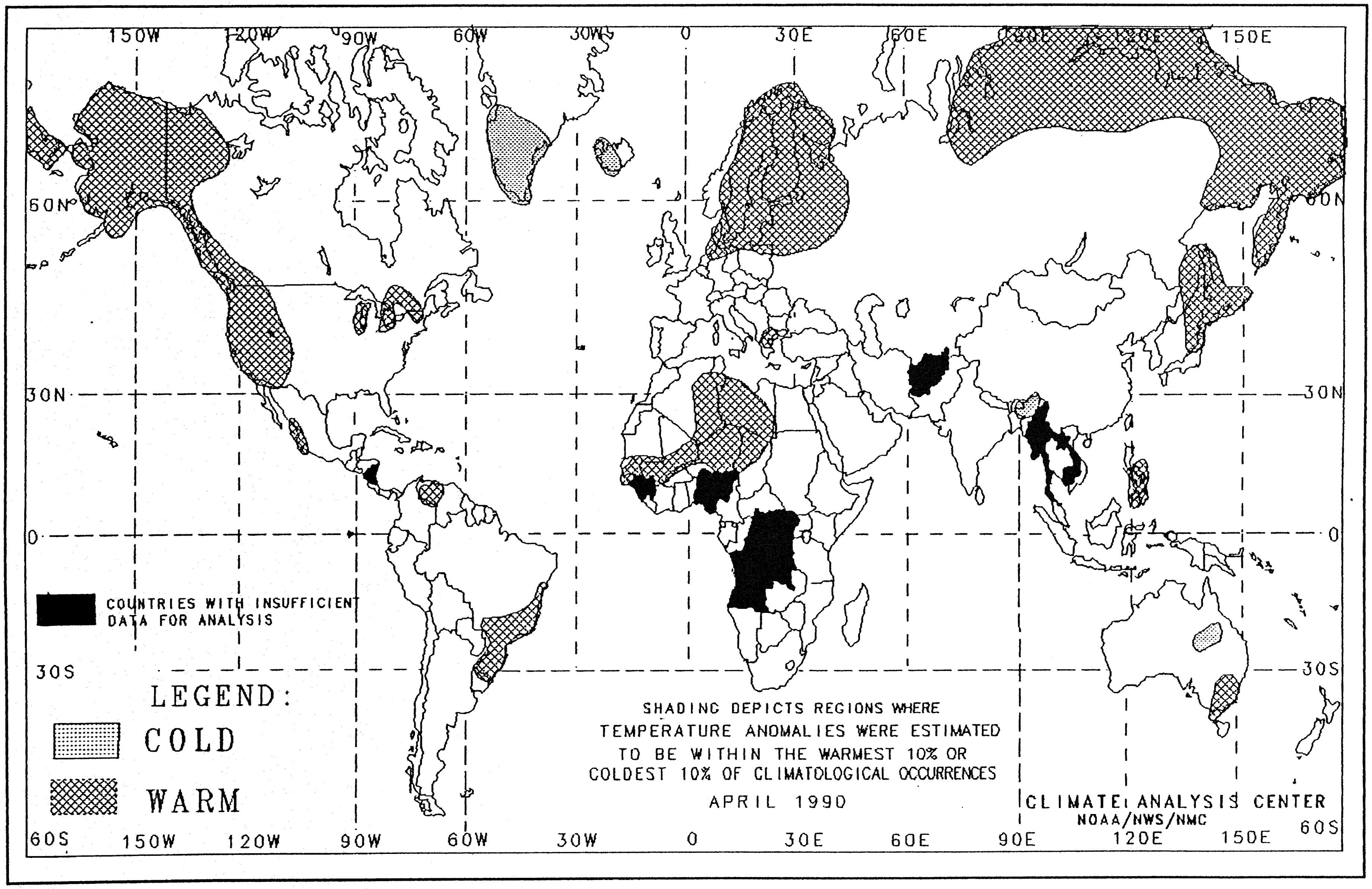
In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

# GLOBAL TEMPERATURE ANOMALIES

*APRIL 1990*




The anomalies on this chart are based on approximately 2500 observing stations for which at least 26 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have reulted in an overestimation of the extent of some warm anomalies.

Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

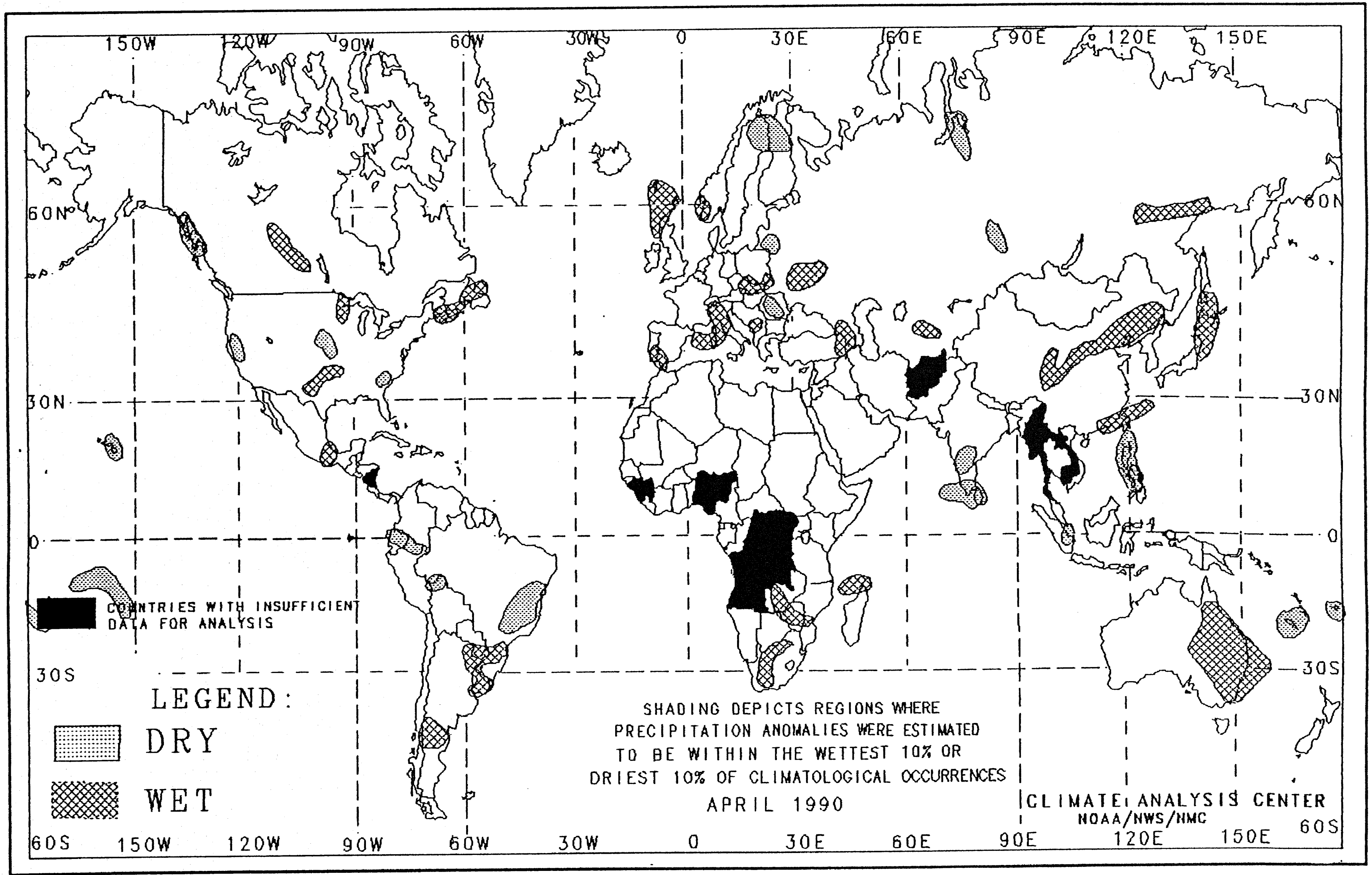
# PRINCIPAL TEMPERATURE ANOMALIES

*APRIL 1990*

| REGIONS AFFECTED | TEMPERATURE AVERAGE (°C) | DEPARTURE FROM NORMAL (°C) | COMMENTS |
|---|---|---|---|
| ***NORTH AMERICA*** | | | |
| Alaska, Western Canada, and Western United States | –14 to +25 | +2 to +9 | WARM – 4 to 12 weeks |
| Eastern Wisconsin | +9 to +10 | +2 to +3 | Very mild second half of April |
| Southern Ontario, Southern Quebec, and Northern Vermont | +5 to +8 | +2 to +3 | Very mild second half of April |
| West Central Mexico | +24 to +27 | +2 to +3 | WARM – 5 to 6 weeks |
| ***SOUTH AMERICA AND EASTERN PACIFIC*** | | | |
| Western Venezuela | +21 to +31 | Around +2 | Very warm first half of April |
| Southern Brazil | +19 to +28 | +2 to +4 | WARM – 2 to 10 weeks |
| ***EUROPE AND THE MIDDLE EAST*** | | | |
| Southern Greenland | –12 to –7 | –3 to –4 | Very cold second half of April |
| Western Iceland | 0 to +1 | Around –3 | Very cold second half of April |
| Northern Europe | +2 to +9 | +2 to +5 | MILD – 2 to 31 weeks |
| Greece | Around +16 | Around +2 | Very warm early in April |
| ***AFRICA*** | | | |
| Sahel and North Central Africa | +20 to +36 | +2 to +3 | WARM – 2 to 4 weeks |
| ***ASIA*** | | | |
| Northern and Eastern Asian Soviet Union | –14 to +2 | +2 to +8 | MILD – 2 to 31 weeks |
| Southeastern Siberia and Northern Japan | 0 to +12 | +2 to +3 | MILD – 2 to 31 weeks |
| Extreme Eastern India | +21 to +23 | Around –3 | Very cold first half of April |
| ***AUSTRALIA AND WESTERN PACIFIC*** | | | |
| Philippines | +29 to +30 | +2 to +3 | WARM – 12 weeks |
| Northeastern Australia | +21 to +22 | Around –2 | Very cool second half of April |
| Southeastern Australia | +15 to +20 | +2 to +3 | Very warm first half of April |

# GLOBAL PRECIPITATION ANOMALIES

*APRIL 1990*




The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the one month period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total one month precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

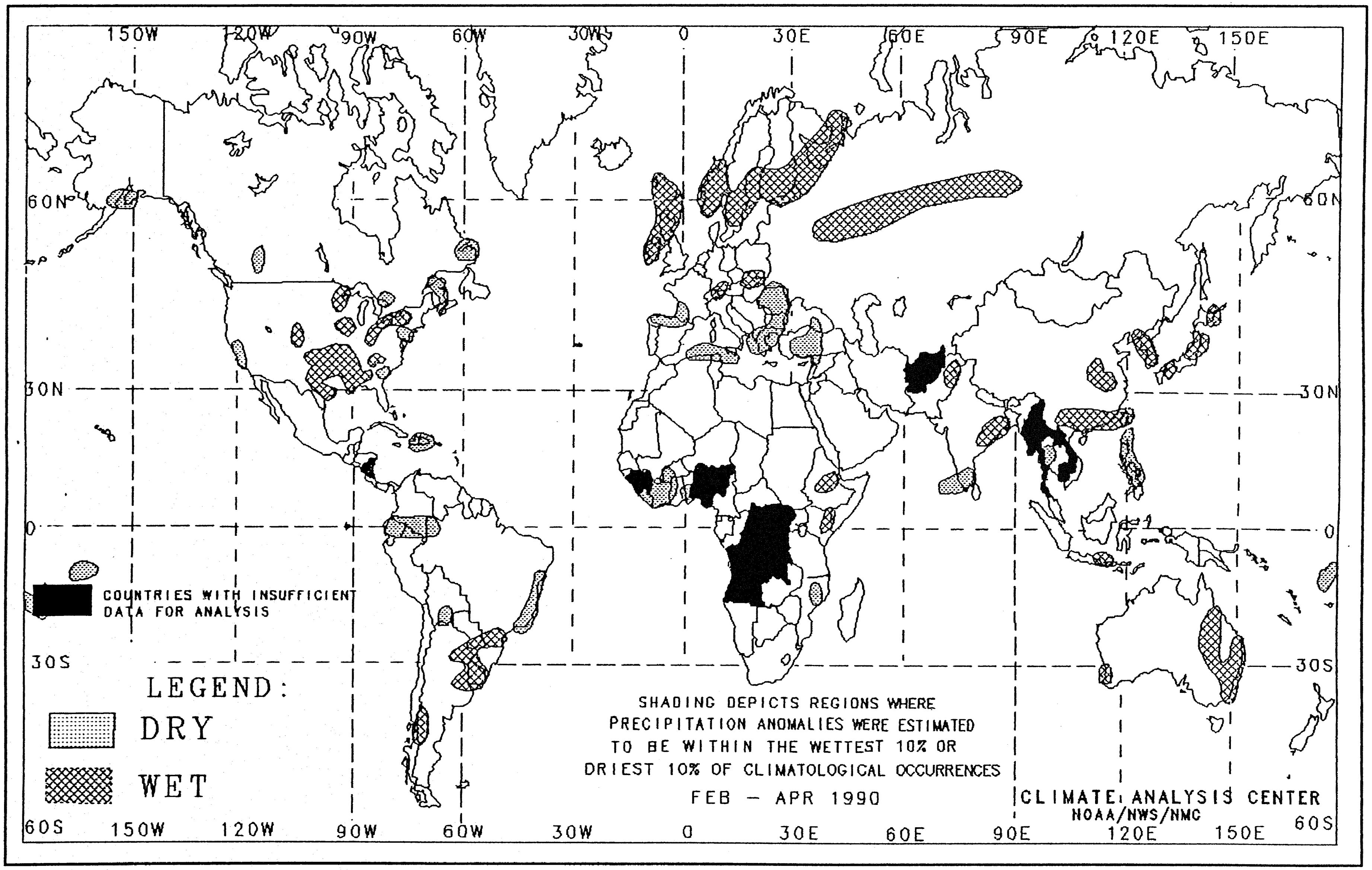
# PRINCIPAL PRECIPITATION ANOMALIES

*APRIL 1990*

| REGIONS AFFECTED | PRECIPITATION TOTAL (MM) | PERCENT OF NORMAL | COMMENTS |
|---|---|---|---|
| ***NORTH AMERICA*** | | | |
| Southeastern Alaska | 28 to 101 | 26 to 45 | DRY – 5 weeks |
| South Central Canada | 53 to 55 | 250 to 264 | Very wet second half of April |
| Eastern Minnesota | 96 to 97 | 176 to 188 | WET – 2 to 9 weeks |
| Canadian Maritime Provinces | 109 to 209 | 166 to 208 | WET – 2 to 4 weeks |
| Northern California | 0 to 2 | 0 to 6 | DRY – 8 to 10 weeks |
| Eastern Nebraska and Northeastern Kansas | 9 to 26 | 12 to 33 | DRY – 5 to 8 weeks |
| Texas, Oklahoma, and Arkansas | 50 to 215 | 194 to 239 | WET – 2 to 10 weeks |
| South Carolina and Georgia | 27 to 32 | 33 to 35 | DRY – 5 weeks |
| Extreme Southern Mexico | 71 to 74 | 277 to 391 | WET – 2 to 10 weeks |
| Hawaiian Islands | 2 to 102 | 7 to 25 | DRY – 9 weeks |
| ***SOUTH AMERICA AND EASTERN PACIFIC*** | | | |
| Fiji Islands | 30 to 110 | 17 to 39 | DRY – 6 to 10 weeks |
| Cook Islands | 11 to 39 | 8 to 26 | DRY – 4 to 5 weeks |
| Ecuador and Northern Peru | 81 to 135 | 46 to 47 | DRY – 4 weeks |
| Northern Bolivia | 76 to 87 | 44 to 46 | DRY – 5 weeks |
| Eastern Brazil | 7 to 49 | 6 to 17 | DRY – 9 to 10 weeks |
| Uruguay, Southern Brazil, and Northeastern Argentina | 180 to 542 | 199 to 391 | WET – 2 to 17 weeks |
| Central Argentina | 70 to 141 | 250 to 603 | Very wet first half of April |
| ***EUROPE AND THE MIDDLE EAST*** | | | |
| Scotland and Faroe Islands | 116 to 203 | 194 to 208 | Very wet first half of April |
| Southwestern Norway | 126 to 254 | 206 to 255 | WET – 4 weeks |
| Northern Sweden and Northern Finland | 7 to 20 | 28 to 50 | DRY – 4 to 10 weeks |
| Lithuania | 7 to 16 | 15 to 41 | DRY – 7 to 8 weeks |
| Czechoslovakia, Hungary, and Poland | 61 to 104 | 158 to 213 | WET – 4 to 8 weeks |
| Ukrainian S.S.R. | 65 to 92 | 183 to 231 | WET – 2 to 8 weeks |
| Romania | 18 to 23 | Around 40 | DRY – 4 to 27 weeks |
| Southern Yugoslavia | 141 to 287 | 207 to 235 | WET – 4 weeks |
| Italy and Mediterranean Islands | 81 to 256 | 192 to 287 | WET – 2 to 6 weeks |
| Gibraltar and Adjacent Parts of Spain | 126 to 132 | 192 to 241 | WET – 6 weeks |
| Eastern Turkey and Adjacent Soviet Union | 94 to 107 | 184 to 188 | Very wet second half of April |
| ***AFRICA*** | | | |
| Northern Madagascar Island and Comoros Islands | 186 to 340 | 334 to 386 | WET – 2 to 5 weeks |
| Zambia, Zimbabwe, and Mozambique | 109 to 297 | 246 to 408 | WET – 4 weeks |
| South Africa | 66 to 111 | 191 to 328 | Very wet second half of April |
| ***ASIA*** | | | |
| Uzbek S.S.R. | 52 to 179 | 237 to 302 | WET – 6 weeks |
| Northwestern Siberia | 6 to 7 | 25 to 31 | DRY – 4 to 10 weeks |
| Southwestern Siberia | 3 to 12 | 17 to 42 | DRY – 6 weeks |
| Eastern Siberia | 57 to 66 | 180 to 306 | WET – 2 to 10 weeks |
| China | 43 to 111 | 178 to 442 | WET – 2 to 9 weeks |
| Northern Japan | 80 to 221 | 163 to 291 | WET – 2 to 6 weeks |
| Taiwan and Southeastern Coast of China | 149 to 992 | 212 to 568 | WET – 2 to 5 weeks |
| Central India | 0 to 6 | 0 to 18 | DRY – 7 weeks |
| Sri Lanka and Southern India | 0 to 43 | 0 to 31 | DRY – 4 to 10 weeks |
| ***AUSTRALIA AND WESTERN PACIFIC*** | | | |
| Philippines | 0 to 35 | 0 to 11 | DRY – 14 weeks |
| New Caledonia | 11 to 75 | 13 to 42 | DRY – 7 weeks |
| Eastern Australia | 56 to 406 | 185 to 1840 | WET – 2 to 10 weeks |
| Sumatra, Indonesia | 99 to 135 | 36 to 50 | DRY – 5 weeks |

# GLOBAL PRECIPITATION ANOMALIES

*FEBRUARY 1990 – APRIL 1990*

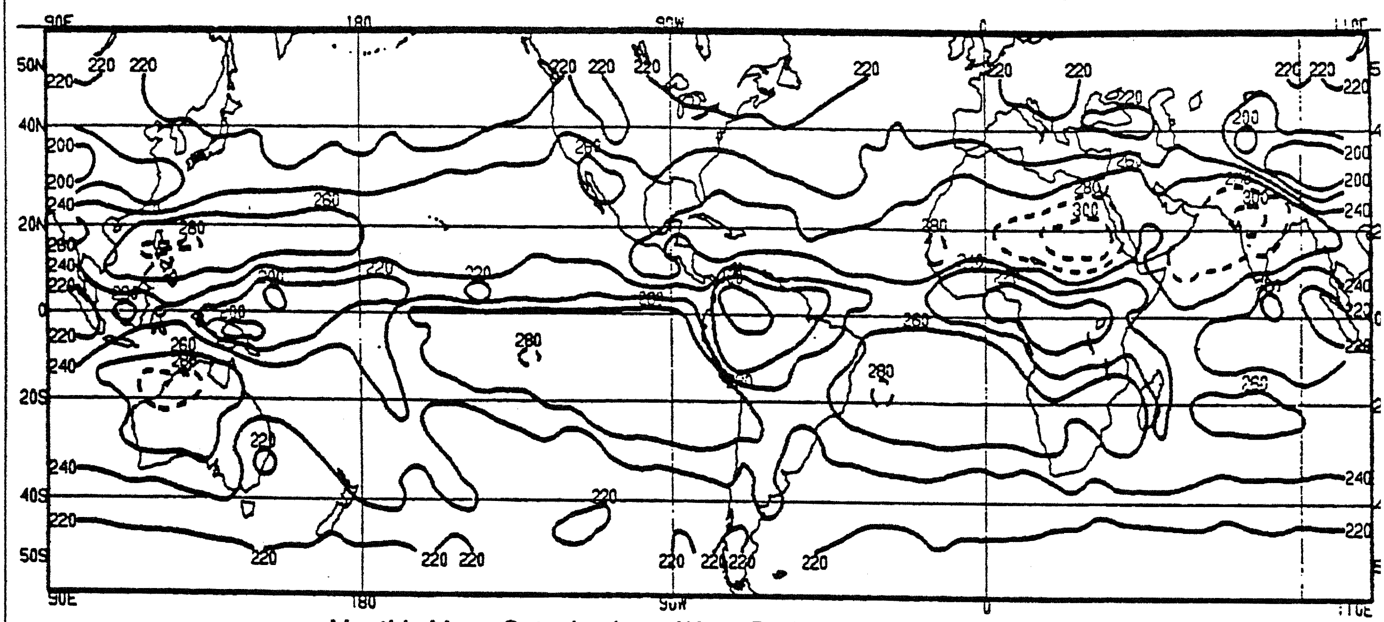



The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, ry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the al three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

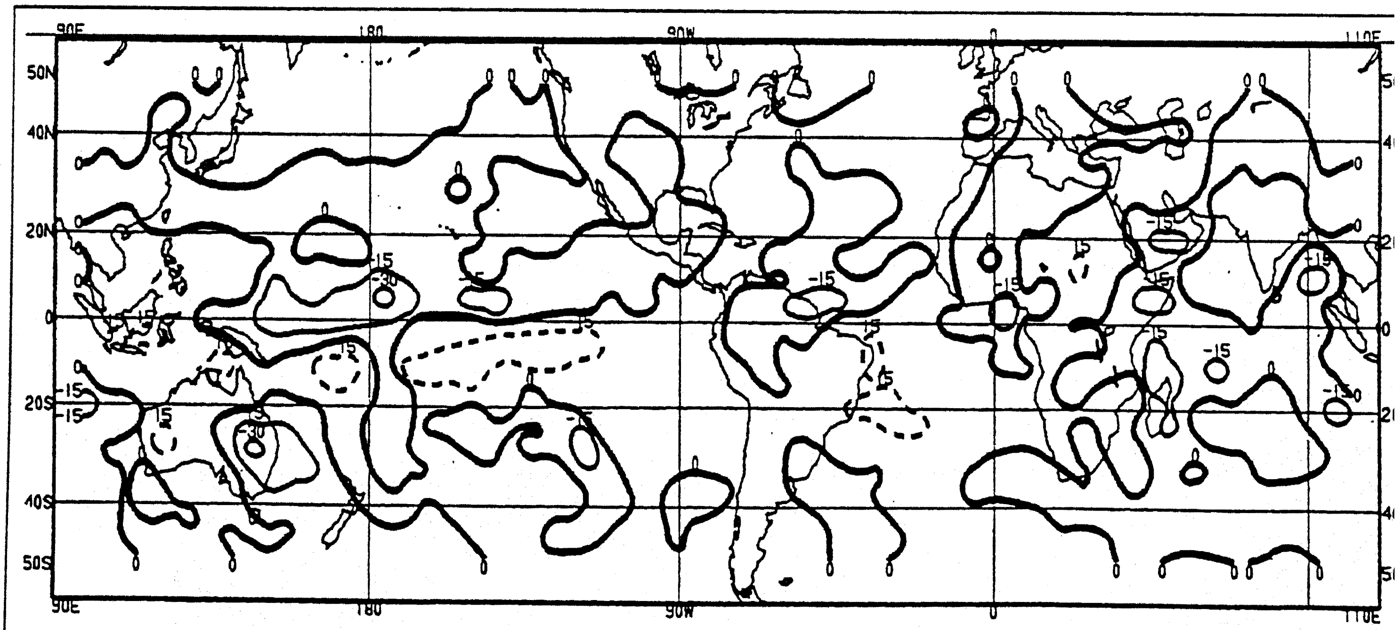



Monthly Mean Outgoing Long Wave Radiation (OLR) for April 1990

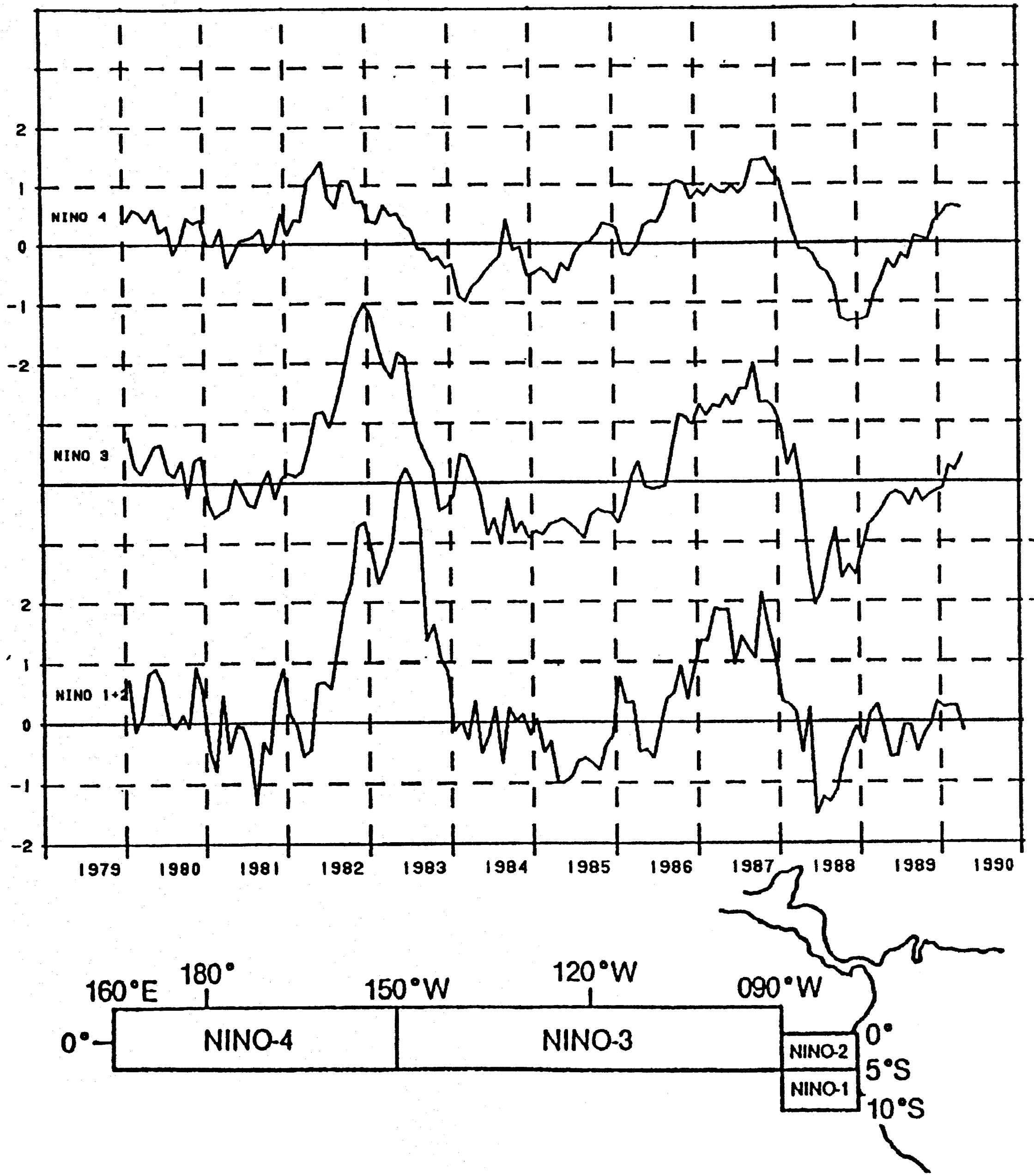
## EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA–9 AVHRR IR window channel by NESDIS/SRL (top) Data are accumulated and averaged over 2.5° areas to a 5° Mercator grid for display. Contour intervals are 20 $Wm^{-2}$, and contours of 280 Wm and above are dashed. In tropical areas (for our purposes 20°N – 20°S) that receive primarily convective rainfall, a mean OLR value of less tha 200 $Wm^{-2}$ is associated with significant monthly precipitation, whereas a value greater than 260 $Wm^{-2}$ normally indicates little or no precipitatior Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non–convective, or in some tropical coastal o island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitatio amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1979 – 1988 base period mear Contour intervals are 15 $Wm^{-2}$, while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.




Monthly Mean Outgoing Long Wave Radiation (OLR) Anomaly for April 1990




rface temperature anomaly indices (°C) for the areas Nino 1+2 is the average over the Nino 1 and d with respect to the COADS/ICE climatology

# SPECIAL CLIMATE SUMMARY

## EL NIÑO SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 90/4

issued by

*DIAGNOSTICS BRANCH*
*THE CLIMATE ANALYSIS CENTER*
*NATIONAL METEOROLOGICAL CENTER, NWS*

May 10, 1990

Weak warm episode conditions continued in the central Pacific during April. The sea surface temperature (SST) anomalies in the Nino 3 and 4 regions were about +0.5°C during April (Figure 1), which represents a slight increase in the Nino 3 region and no change in the Nino 4 region from values observed during March. Stronger than normal convection continued to be observed in the central equatorial Pacific (Figure 2), consistent with the positive SST anomalies. In spite of these warm episode indications, the April equatorial low–level easterlies were near or slightly stronger than normal and the Southern Oscillation Index, based on the sea level pressure anomalies at Tahiti and Darwin, Australia, was zero.

The intraseasonal (30–60 day) oscillations have contributed greatly to the large month–to–month variability which has dominated the tropical circulation pattern since November 1989. However, time–longitude sections, constructed using pentad (5–day averaged) data, of anomalous low–level winds, outgoing longwave

radiation (OLR) and sea level pressure (Figures 3, 4, and 5) show a reversal in the overall pattern of anomalies between mid–1989 and the last several months. Westerly wind (positive sea level pressure) anomalies have replaced easterly wind (negative sea level pressure) anomalies in the region of Indonesia and the western equatorial Pacific, negative OLR anomalies have replaced positive OLR anomalies in the central Pacific, and negative sea level pressure anomalies have replaced positive anomalies in the central Pacific. These features are characteristic of warm episodes.

The changes in the depth of the 20°C isotherm (a measure of the depth of the oceanic thermocline) over the last several months also indicate the evolution to warm episode conditions. The thermocline has deepened in the eastern Pacific and shoaled (become less deep) in the western Pacific (Figure 6). By the end of April the 20°C isotherm was deeper than 50 m in the extreme eastern equatorial Pacific. A similar deepening of the thermocline was observed in late 1986 during the 1986–87 warm (ENSO) episode. Also, the depth of the 20°C isotherm in the western equatorial Pacific during April 1990 is comparable to that observed in late 1986.

Although there has been considerable month–to–month variability in many indices in the tropical Pacific, an underlying trend towards a warm episode is also evident. Several ENSO prediction techniques are now indicating a continuation of the warming trend through the next several months. However, all of these techniques have very low skill during this time of year.

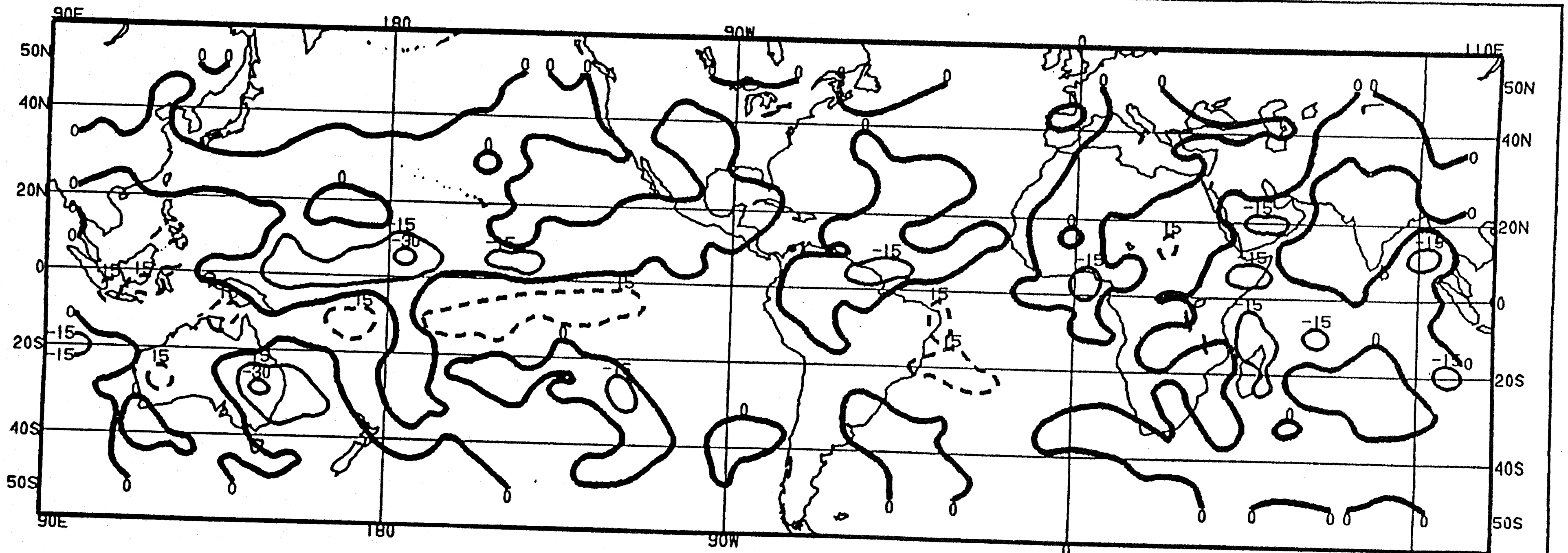



Figure 2. Anomalous outgoing longwave radiation for April 1990 (NOAA-11 AVHRR IR window channel measurements by NESDIS/SRL). Anomalies are computed as departures from the 1979-1987 base period mean. Contour interval is 15 Wm-2. Positive anomalies are indicated by dashed contours.

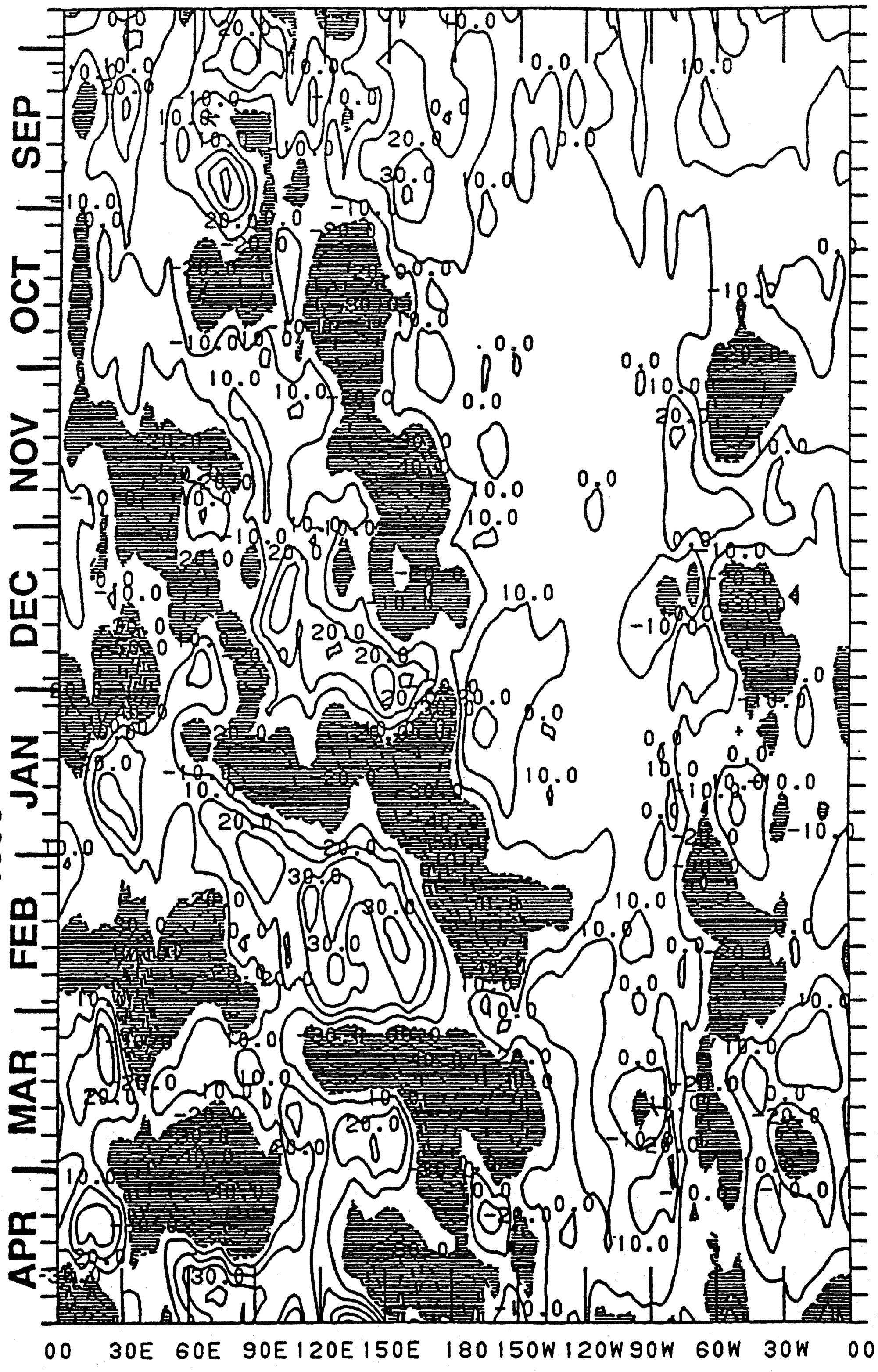



Figure 3. Time-longitude section (5°N-5°S) of anomalous outgoing longwave radiation. Anomalies are computed for each pentad (5-day period). Contour interval is 10 Wm-2 and negative contours are dashed. Values less than -10Wm-2 are shaded.

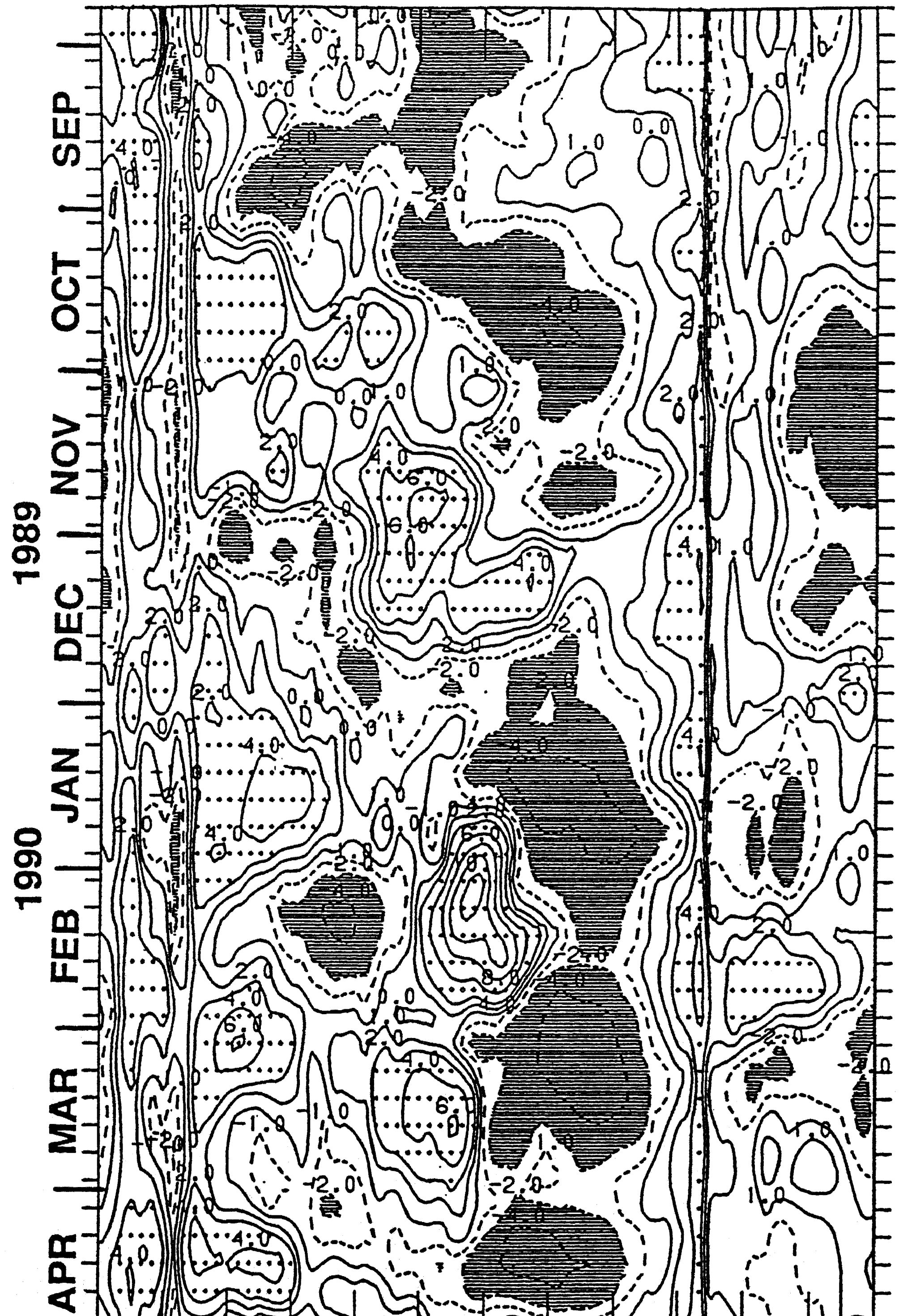



Figure 4. Time-longitude section (5°N-5°S) of anomalous 850 mb zonal winds. Anomalies are computed with respect to the 1979-1987 base period. Contour interval is 2 ms-1, with additional contours for + and -1. Values greater than 2 ms-1 are shaded.

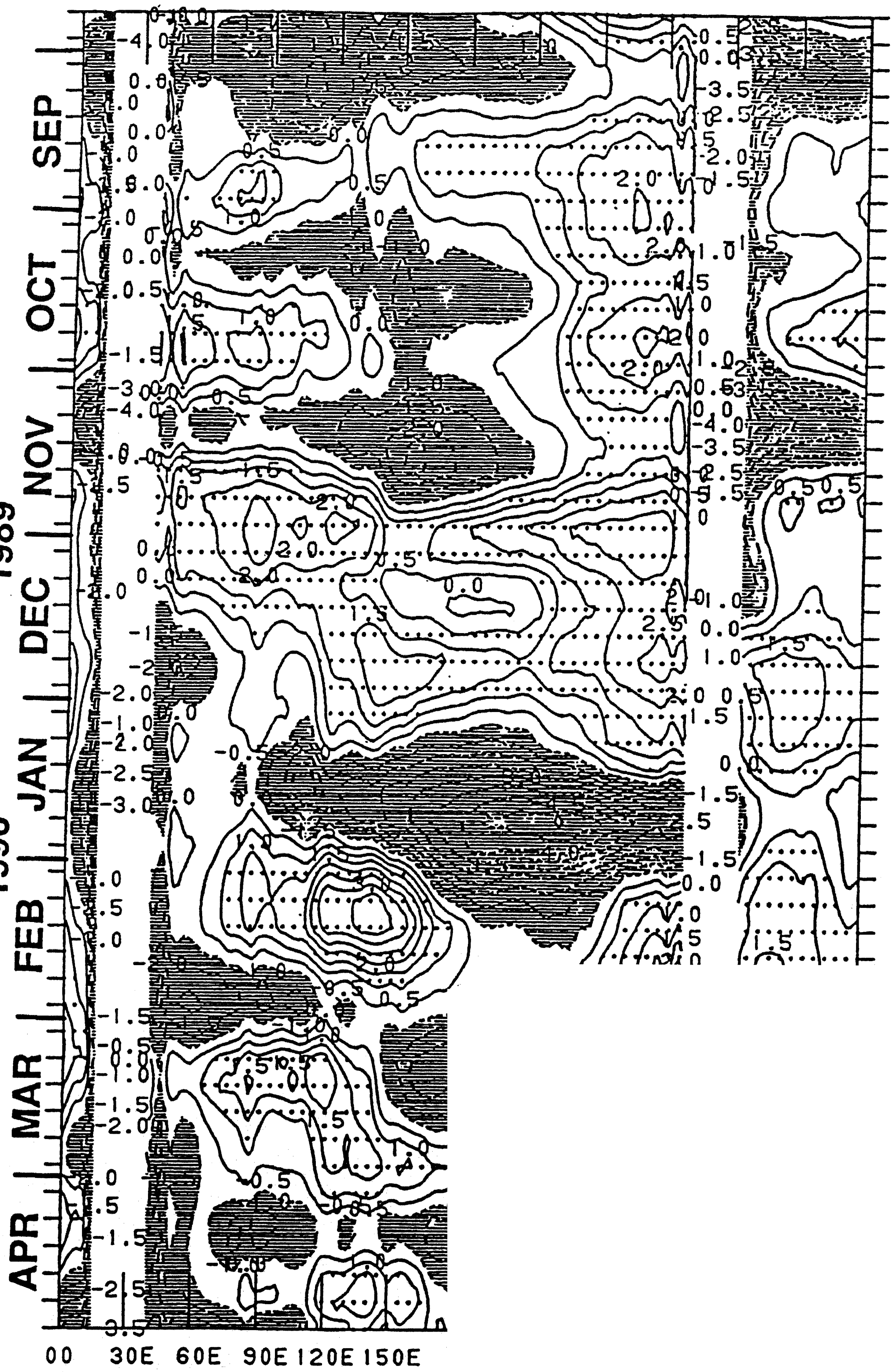



Figure 5. Time-longitude section (5°N-!
Contour interval is 0.5 mb. Values
values less than -0.5 mb are shadec

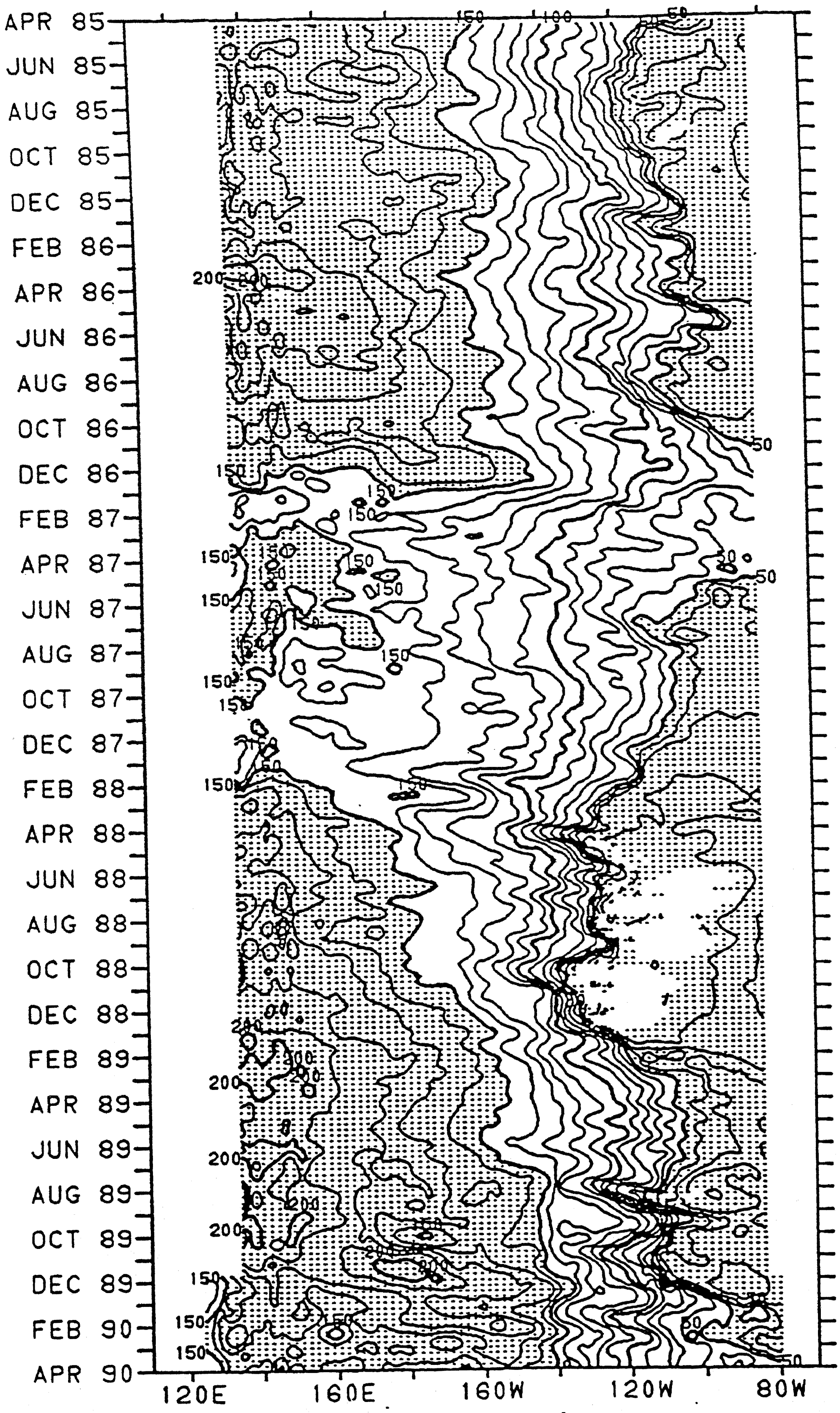



Figure 6. Depth of the 20°C isotherm along the equator in the Pacific Ocean. The contour interval is 10 m with shading for values less than 50 m and also for values greater than 150 m.